EIGHTH EDITION

Psychology

CORE CONCEPTS

Philip Zimbardo • Robert Johnson • Vivian McCann

Pearson

Psychology

Core Concepts

Eighth Edition

Philip Zimbardo
Stanford University

Robert Johnson
Umpqua Community College

Vivian McCann
Portland Community College

Acknowledgements of third party content appear on page 671, which constitutes an extension of this copyright page.

Pearson

Brief Contents

This page intentionally left blank

Contents

6   Thinking and Intelligence   188

7 Development Over the Life Span   231

CHAPTER PROBLEM: Do the amazing accounts of similarities in twins reared apart indicate we are primarily a product of our genes? Or do genetics and environment work together to influence growth and development over the life span?   232

12 Psychological Disorders 464

CHAPTER PROBLEM: Is it possible to distinguish mental disorder from merely unusual behavior? That is, are there specific signs that clearly indicate mental disorder? 465

13 Therapies for Psychological Disorders   497

CHAPTER PROBLEM: What is the best treatment for Derek's depression: psychological therapy, drug therapy, or both? More broadly, the problem is this: How do we decide among the available therapies for any of the mental disorders?   498

14 From Stress to Health and Well-Being   535

This page intentionally left blank

To the Student ...

There is one simple formula for academic success, and the following demonstration will show you what it is. Study this array of letters for a few seconds:

I B M U F O F B I L O L

Now, without peeking, write down as many of the letters as you can (in the correct order).

Most people remember about five to seven letters correctly. A few people get them all. How do these exceptional few do it? They find a pattern. (You may have noticed some familiar initials in the array above: IBM, UFO, FBI, LOL.) Finding the pattern greatly eases the task because you can draw on material that is already stored in memory. In this case, all that needs to be remembered are four "chunks" of information instead of 12 unrelated letters.

The same principle applies to material you study for your psychology class. If you try to remember each piece of information as a separate item, you will have a difficult time. But if instead you look for patterns, you will find your task greatly simplified—and much more enjoyable.

Using Psychology to Learn Psychology

So, how can you identify the patterns? Your friendly authors have developed several learning features that will make meaningful patterns in the text stand out clearly:

CORE CONCEPTS   We have organized each major section of every chapter around a single big idea called a Core Concept. For example, one of the four Core Concepts in Chapter 5, *Memory*, says:

> **Core Concept**
>
> Human memory is an information-processing system that works constructively to encode, store, and retrieve information.

The Core Concept, then, becomes the central theme around which about 10 pages of material—including several new terms—are organized. As you read each chapter, keeping the Core Concept in mind will help you encode the new terms and ideas related to that concept, store them in your memory, and later retrieve them when you are being tested. To borrow an old saying, the Core Concepts become the "forest," while the details of the chapter become the "trees."

KEY QUESTIONS   Each Core Concept is introduced by a Key Question that also serves as a main heading in the chapter. Here, for example, is a Key Question from the *Memory* chapter:

Key Question: Why Does Memory Sometimes Fail Us, and What Can We Do About It?

Key Questions such as this will help you anticipate the most important point, or the Core Concept, in the section. In fact, the Core Concept always provides a brief answer to the Key Question. Think of the Key Question as the high beams on your car, helping you focus on what lies ahead. Our Key Questions should also serve as guides for you in posing questions of your own about what you are reading.

Both the Key Questions and the Core Concepts later reappear as organizing features of the Chapter Summary.

PSYCHOLOGY MATTERS   Psychology has many captivating connections with events in the news and in everyday life, and we have explored one of these connections at the end of each major section in every chapter. To illustrate, here are some examples from the *Memory* chapter:

- Would You Want a "Photographic" Memory?
- "Flashbulb" Memories: Where Were You When … ?
- On the Tip of Your Tongue

Such connections—practical, down to earth, and fascinating—will help you link your study of psychology with your real-life experiences. They will also help you critically evaluate many of the psychological ideas you encounter in the media—as when you see news stories that begin with "psychological research shows that …" By the end of this course, you will become a much wiser consumer of such information. Some of these features have a special focus on applying psychology to learning and studying, so students gain practical tips on how to "Use Psychology to Learn Psychology."

DO IT YOURSELF!   Throughout the text we have scattered active-learning demonstrations like the one in which you were asked to memorize the letters I B M U F O F B I L O L. Besides being fun, these activities have the serious purpose of illustrating important principles discussed in the text. In Chapter 5, for example, one *Do It Yourself!* box helps you find the capacity of your short-term memory; another lets you test your "photographic memory" ability.

KEY TERMS   The most important terms appear in **boldface,** with their glossary definitions readily accessible when you rollover the term. We list these terms again in the Chapter Summary. Then, at the end of the text, a

comprehensive glossary gathers together all the key terms and definitions from each chapter in one easy-to-find location.

CHAPTER SUMMARIES We have written our Chapter Summaries to provide you with an overview of main points in each chapter—to help you preview and review the chapter. The summaries are organized around the Key Questions and Core Concepts introduced within the chapter to facilitate review and mastery of chapter material. But we offer one caution: Reading the Chapter Summary will not substitute for reading the entire chapter! Here's a helpful hint: We recommend that you read the summary before you read the rest of the chapter to get a flavor of what's ahead, then reread the summary after you finish the chapter. Reading the summary before will provide a framework for the material so that it can be more easily encoded and stored in your memory. And, naturally, reviewing the summary after reading the chapter will reinforce what you have just learned so that you can retrieve it when needed on an examination.

Thinking Like a Psychologist

Learning all the facts and definitions of psychology won't make you a psychologist. Beyond the facts, *thinking like a psychologist* requires learning some *problem-solving* skills and *critical thinking* techniques that any good psychologist should possess. With this goal in mind, we have added two unique features to this text.

CHAPTER-OPENING PROBLEMS Each chapter begins with an important problem that you will learn how to solve with the tools you acquire in your reading. Examples of the chapter-opening problems include testing the claim that sweet treats give children a "sugar high," evaluating claims of recovered memories, and judging the extent to which the people we call "geniuses" are different from the rest of us.

CRITICAL THINKING APPLIED At the end of each chapter, you will be asked to consider issues disputed among psychologists and issues raised in the media, such as the nature of the unconscious mind and the effects of subliminal persuasion. Each of these issues requires a skeptical attitude and the application of a special set of critical thinking skills that we will introduce in Chapter 1.

We have one final suggestion to help you succeed in psychology: This text is filled with examples to illustrate the most important ideas, but you will remember these ideas longer if you generate your own examples as you study. This habit will make the information yours as well as ours. And so we wish you a memorable journey through the field we love.

Phil Zimbardo
Bob Johnson
Vivian McCann

Revel™

Educational technology designed for the way today's students read, think, and learn

When students are engaged deeply, they learn more effectively and perform better in their courses. This simple fact inspired the creation of REVEL: an immersive learning experience designed for the way today's students read, think, and learn. Built in collaboration with educators and students nationwide, REVEL is the newest, fully digital way to deliver respected Pearson content.

REVEL enlivens course content with media interactives and assessments — integrated directly within the authors' narrative — that provide opportunities for students to read about and practice course material in tandem. This immersive educational technology boosts student engagement, which leads to better understanding of concepts and improved performance throughout the course.

Learn more about REVEL by going to www.pearson-highered.com/revel

New To This Edition

The new *Psychology: Core Concepts*, 8th ed., comes in an electronic format, available from the "cloud" both on standard computers and mobile devices. The features you know and love from the seven earlier editions are all there: Key Questions, Core Concepts, the Chapter Problem, Critical Thinking Applied, and an emphasis on diversity and cross-cultural psychology—all presented with an engaging writing style and clear examples of every concept.

The new electronic format takes reader interactivity with the material to a new level through videos, slide-shows, an interactive virtual brain, and click-and-reveal activities aimed to promote deeper thinking and analysis of topics and concepts. Assessment activities are woven into each section, and include brief "journaling" questions and Shared Writing (a form of discussion board activity), all carefully crafted to encourage and improve critical thinking.

And, of course, the new edition introduces many new and exciting developments in psychology. Examples include the exploding field of epigenetics and its implications for development, health, and mental disorder; initiatives to develop brain-based alternatives to the DSM-5; Bandura's theory of moral disengagement to help explain immoral acts; and the amazing power of *mindset,* discovered by Carol Dweck. All the new material is linked with one of psychology's Core Concepts.

This edition of *Psychology: Core Concepts* is certainly no perfunctory revision or slap-dash update. In addition to our revolutionary new Revel format, here is a more

detailed, chapter-by-chapter look at the new material in the 8th edition:

Chapter 1–Mind, Behavior, and Psychological Science

- The opportunities and ethical issues in using Social Media Websites (SMWs) for research
- Applying Critical Thinking Guidelines to the issue of whether childhood vaccinations cause autism
- Updated careers in psychology including environmental psychology and geropsychology

Chapter 2–Biopsychology, Neuroscience, and Human *Nature*

- Epigenetics, and how experiences change gene expression, including the effects of touch, exercise, nutrition, and toxins on stress, health, and development
- New findings on plasticity, including the effects of porn on the brain
- Traumatic brain injury and plasticity
- New research on the cerebellum's important role in cerebral functions, facilitating emotional, sensory, and cognitive functioning – and possibly even involved in schizophrenia
- The latest in brain implants
- Critically thinking about mirror neurons

Chapter 3–Sensation and Perception

- Understanding how Muller cells tunnel light through the layers of the retina
- New research on pain
- Update on the psychology of hearing loss
- Update on the What and the Where pathways in the brain
- Many new illustrations and illusions

Chapter 4–Learning and Human *Nurture*

- Expanded coverage of classical conditioning in advertising, including humor, product placement, celebrity endorsement, and evaluative conditioning
- Classical conditioning techniques applied to wildlife management and conservation
- Expanded section on use of token economies in all levels of education, from kindergarten to college, as well as home and clinical uses
- An update on media and video-game violence
- New information and examples of social learning in the animal world
- Applications of social learning theory to solve social problems (family planning, HIV awareness, adult literacy, etc.)
- New findings examining how social interactions promote political actions.

Chapter 5–Memory

- Chapter re-worked to emphasize application to study strategies and students' lives throughout
- The biological basis of transience – how remembering can actually cause forgetting
- New research demonstrating that prospective memory accounts for half of memory loss, including strategies for overcoming this problem
- The neuroscience of PTSD and memory

Chapter 6–Thinking and Intelligence

- Use of analogies in engineering and marketing
- New examples of functional fixedness, mental set, hindsight bias, and anchoring
- Nobel-laureate Daniel Kahneman's 2-stage theory of thinking
- Updated section on creativity, including Shelley Carson's work on the minds of highly creative people
- New findings on intelligence, including changes in the Flynn Effect
- The DSM-V and Intellectual Disability
- Theory of mind in animals
- The effects of poverty and nutrition on neural development
- Carol Dweck's work on fixed vs. growth mindsets
- The newest findings on stereotype threat and performance, including interventions
- Do brain training programs like Lumosity really work? What the research reveals

Chapter 7–Development Over the Lifespan

- The latest research on neural development in early life, including plasticity, pruning and possible connection to autism, and sensitive periods
- Oxytocin in infant massage and optimal development
- Effects of poverty and nutrition on development
- Updated and expanded section on ADHD, including a positive viewpoint on ADHD
- Updated research on body image and sexuality in adolescence
- Bandura's theory of moral disengagement, and its application to understanding immoral actions, including bullying and cyberbullying
- Zimbardo's work on the Demise of Guys – challenges young men are experiencing in the 21st century
- The sexualization of girls

Chapter 8–States of Consciousness

- The newest research on patients' awareness during coma and persistent vegetative states, and what family

and medical professionals can do to help a person recover from this state
- Updated section on the default network in daydreaming
- Revised and updated section on dreaming, including the latest research on dreaming and memory, as well as cultural perspectives on dreaming
- The latest data on trends in drug use in teens and adults
- Medical uses of marijuana

Chapter 9–Motivation and Emotion

- How social and emotional learning enhances student achievement
- The new psychology of pride
- Emotional influences on memory
- Update on the biopsychology and evolutionary psychology of weight control and of sexuality
- Update on facial expressions of emotion
- Update on Walter Mischel and his "marshmallow test"

Chapter 10–Personality

- All major theories of personality organized around case study of Mary Calkins, pioneering female psychologist
- Personality disorders introduced here (and revisited in Disorders chapter)
- Understanding people who engage in unusual behavior, such as mass murder
- Big Five traits related to US geography and Facebook user styles
- Positivity as core of personality and well-being
- Updated presentation of the Myers-Briggs (MBTI)
- Existential approach to understanding personality, and logo therapy
- Updated research on Hardiness and grit
- Time Perspectives as a personality style
- Adverse economic conditions, like unemployment, impact personality functioning
- Role of contexualism in understanding cultural shaping of personality
- Uniqueness of individual personality–much like fingerprints and snowflakes

Chapter 11–Social Psychology

- New Hollywood movies on Milgram's research, *Experimenter,* 2015, and Zimbardo's prison study, *The Stanford Prison Experiment*, 2015.
- Heroic defiance of evil situations, with powerful examples.
- Updated examples of Milgram obedience study power effects and recent real world instances.
- Expanded section on dehumanization and its role in recent genocides.

- Implicit racial bias in criminal sentencing.
- Expanded treatment of system power.
- Expanded, updated treatment of bullying.
- Expanded, updated treatment of terrorism.
- Social pain from various sources is comparable to physical pain.

Chapter 12–Psychological Disorders

- Just as the new DSM-5 comes out, the NIMH and other powerful groups are re-conceptualizing mental disorders along the lines suggested by brain research
- Epigenetics plays a role in mental disorder
- Hallucinations are influenced by culture: The voices can be comforting for some
- Has a biological marker for schizophrenia been found at last?
- Autism may reflect a failure to "prune" synapses in the first few years of life

Chapter 13–Therapies for Psychological Disorders

- New, nontraditional therapies: teletherapy, exercise, and culturally adapted therapies
- Reasons for the increased use of biomedical therapies
- Ethical debate: Use of memory-numbing drugs for PTSD and for soldiers in combat
- Update on evidence-based practice
- Update on electro-convulsive therapy

Chapter 14–Stress, Health, & Well-Being

- Social rejection, being shunned as "silent bullying", with personal account by Zimbardo
- PTSD, new research on neurobiological effects of blast exposure, as well as effective treatment with time perspective therapy
- Negative effects of growing up in poverty on brain functioning
- Expanded and updated section on burnout and job stress
- Frankel's search for meaning in existence
- The power of physical exercise in mental and physical health
- The failure of national health promotion campaigns
- Happiness research and personal applications

A Note of Thanks

Nobody ever realizes the magnitude of the task when taking on a textbook-writing project – a process that grew exponentially this edition with our transition to the digital format. Pearson Content Manager Carly Czech superbly reigned over the process, gracefully managing

to balance a big-picture view of scheduling and work-flow with careful attention to the details of each chapter and the text as a whole, while keeping the entire team on track and supported at every turn and ensuring that our text meets our many mutual goals. Project Manager Mickey Mankus deftly guided (and prodded) us through this process, providing timely reminders and friendly encouragement when deadlines loomed. The keen eye of Developmental Editor Julie Kelly helped ensure that our narrative remained tight and student-friendly, and Julie also juggled the multiple movements of each chapter between the authors and many other members of our team, somehow keeping track of it all. The vision of the eighth edition blossomed into reality under the skillful guidance of Rashida Patel and Shobhita Tripathi, our brilliant Instructional Designers, who has made this new edition a learning package that we had previously only dreamed of.

The job of making the manuscript into the dual offering of both a digital product and a printed textbook fell to Production Project Manager Megha Bhardwaj and Kristin Landon, our copyeditor. We think they did an outstanding job—as did our tireless photo researcher, Jen Simmons.

We are sure that none of the above would be offended if we reserve our deepest thanks for our spouses, closest colleagues, and friends who inspired us, gave us the caring support we needed, and served as sounding boards for our ideas. Phil thanks his wonderful wife, Christina Maslach, for her endless inspiration and for modeling what is best in academic psychology. He has recently passed a milestone of 50 years of teaching the introductory psychology course, from seminar size to huge lectures to more than 1,000 students. Phil continues to give lectures and colloquia to college and high school groups throughout the country and overseas. He still gets a rush from lecturing and from turning students on to the joys and fascination of psychology. His new "psych rock star" status comes mostly from generations of students who have grown up watching him perform on the *Discovering Psychology* video series in their high school and college psychology courses.

Bob is grateful to his spouse, best friend, and best editor Michelle, who has for years put up with his rants on topics psychological, his undone household chores, and much gratification delayed—mostly without complaint. She has been a wellspring of understanding and loving support and the most helpful of reviewers. His thanks, too, go to Rebecca, their daughter, who has taught him the practical side of developmental psychology—and now, much to her own astonishment and an undergraduate lapse into sociology, possesses her own graduate degree in psychology. In addition, he is indebted to many friends, most of whom are not psychologists but who are nevertheless always eager to raise and debate interesting issues about the applications of psychology to everyday life. Readers will find topics they have raised throughout the text and especially in the chapter-opening "problems" and in the critical thinking sections at the end of each chapter.

Vivian's thanks go first to her husband, Shawn for his love , support, and impish humor in times of stress. Writing two books at the same time - while still teaching full-time – turned out to be a challenge beyond our wildest dreams (or nightmares), and Shawn and their son Blaze graciously endured months of wondering if Vivian would ever emerge from her office! They pitched in like the champs they are, though, keeping the household chores done, finding ways to amuse and occupy themselves and our dogs, and suffering through way too much fast food. Vivian also appreciates the many students, friends, and colleagues who have both encouraged and challenged her over the years, along with Executive Editor Stephen Frail for first suggesting that she join the author team of Phil Zimbardo and Bob Johnson. Many psychological experts and expert teachers of introductory psychology also shared their constructive criticism with us on every chapter and feature of the eighth edition of this text: Chris Brill, Old Dominion University; Allison Buskirk, Cohen, Delaware Valley College; Christie Chung, Mills College; Elizabeth Curtis, Long Beach City College; Linda DeKruif, Fresno City College; Carrie E. Hall, Miami University; Jeremy Heider, Stephen F. Austin State University; Brian Littleton, Kalamazoo Valley Community College; Lillian McMaster, Hudson County Community College; Nancy Melucci, Long Beach City College; Jared Montoya, The University of Texas at Brownsville; Suzanne Morrow, Old Dominion University; Katy Neidhardt, Cuesta Community College; Donna Nelson, Winthrop University; Barbara Nova, Dominican University of California; Karl Oyster, Tidewater Community College; Sylvia Robb, Hudson County Community College; Hildur Schilling, Fitchburg State College; Hilary Stebbins, Virginia Wesleyan College; Doris Van Auken, Holy Cross College

We also thank the reviewers of the previous editions of *Psychology: Core Concepts* and hope that they will recognize their valued input in all that is good in this text.

Finally, we offer our thanks to all of the colleagues whose feedback has improved our book. Thanks also to all instructors of this most-difficult-to-teach course for taking on the pedagogical challenge and conveying to students their passion about the joys and relevance of psychological science and practice.

If you have any recommendations of your own that we should not overlook for the next edition, please write to us! Address your comments to our Facebook page: https://www.facebook.com/Psychology-Core-Concepts-214526791978469/.

This page intentionally left blank

About the Authors

Philip Zimbardo, PhD, Stanford University professor, has been teaching the introductory psychology course for 50 years and has been writing the basic text for this course, as well as the faculty guides and student workbooks, for the past 35 years. In addition, he has helped to develop and update the PBS-TV series, *Discovering Psychology,* which is used in many high school and university courses both nationally and internationally. He has been called "The Face and Voice of Psychology" because of this popular series and his other media presentations. Phil also loves to conduct and publish research on a wide variety of subjects, as well as teach and engage in public and social service activities. He has published more than 400 professional and popular articles and chapters, including 50 books of all kinds. He recently published a trade book on the psychology of evil, *The Lucifer Effect,* that relates his classic Stanford Prison Experiment to the abuses at Iraq's Abu Ghraib Prison. In addition, Phil is delighted by the new Hollywood movie, The Stanford Prison Experiment (2105) on which he actively consulted. His newest books are *The Time Paradox*, and *The Time Cure*, but his new passion is helping to create wise and effective everyday heroes as part of his Heroic Imagination Project. Please see these websites for more information: www.zimbardo.com; www.prisonexp.org; www.PsychologyMatters.org; www.theTimeParadox.com; www.LuciferEffect.com; www.HeroicImagination.org.

Robert Johnson, PhD, taught introductory psychology for 28 years at Umpqua Community College. He acquired an interest in cross-cultural psychology during a Fulbright summer in Thailand, followed by many more trips abroad to Japan, Korea, Latin America, Britain, and, most recently, to Indonesia. Currently, he is working on a book on the psychology in Shakespeare. Bob is especially interested in applying psychological principles to the teaching of psychology and in encouraging linkages between psychology and other disciplines. In keeping with those interests, he founded the Pacific Northwest Great Teachers Seminar, of which he was the director for 20 years. Bob was also one of the founders of Psychology Teachers at Community Colleges (PT@CC), serving as its executive committee chair during 2004. That same year, he also received the Two-Year College Teaching Award given by the Society for the Teaching of Psychology. Bob has long been active in APA, APS, the Western Psychological Association, and the Council of Teachers of Undergraduate Psychology.

Vivian McCann, a senior faculty member in psychology at Portland Community College in Portland, Oregon, teaches a wide variety of courses, including introductory psychology, human relations, intimate relationships, personality, and social psychology. Born and raised in the California desert just 10 miles from the Mexican border, she quickly learned the importance of understanding cultural backgrounds and values in effective communication, which laid the foundation for her lifelong interest in teaching and learning psychology from diverse cultural perspectives. Vivian loves to explore new cultures through travel, and to nurture the same interests in her students. She has led groups of her students on four trips abroad, and in her own travels has visited 35 countries so far. Her most recent adventure took her to Africa for four months, where she volunteered with women in Tanzania, worked with elephants and endangered rhinos in Zimbabwe, and trekked into the mountains of Rwanda to observe gorillas in the wild. Vivian maintains a strong commitment to teaching excellence and has developed and taught numerous workshops in that area. She has served on the APA's executive committee for Psychology Teachers at Community Colleges (PT@CC) and is an active member of the Western Psychological Association and APS. She is also the author of *Human Relations: The Art and Science of Building Effective Relationships*. Her most recent passion involves working with The Heroic Imagination Project, a non-profit organization dedicated to teaching people of all ages to stand up, speak out, and develop their own inner heroes in pursuit of a more compassionate world.

This page intentionally left blank

Chapter 1
Mind, Behavior, and Psychological Science

Does sugar really make kids hyper? Using Use psychology to find out.

⌄ Core Concepts

1.1 Psychology is a broad field, with many specialties, but fundamentally psychology is the science of behavior and mental processes.

1.2 Six main viewpoints dominate modern psychology—the biological, cognitive, behavioral, whole-person, developmental, and sociocultural perspectives—each of which grew out of radical new concepts about mind and behavior.

1.3 Psychologists, like all other scientists, use the scientific method to test their ideas empirically.

"After the kids had all that sugar—the cake, ice cream, punch, and candy—they were absolutely bouncing off the walls!" said one of our friends who was describing a birthday party for her 8-year-old daughter.

I must have had a skeptical look on my face, because she stopped her story short and asked, "You don't believe it?" Then she added, "You psychologists just don't believe in common sense, do you?"

I responded that what people think of as "common sense" can be wrong, reminding her that common sense once held that Earth was flat. "Perhaps," I suggested, "it might be wrong again—this time about the so-called sugar high people think they observe.

"It could have been just the excitement of the party," I added.

"*Think* they observe?" my friend practically shouted. "Can you *prove* that sugar doesn't make children hyperactive?"

"No," I said. "Science doesn't work that way. But what I *could* do," I ventured, "is perform an experiment to test the idea that sugar makes children 'hyper.' Then we could see whether your claim passes or fails the test."

My timing wasn't the best for getting her involved in a discussion of scientific experiments, so let me pose the problem to you.

> **CHAPTER PROBLEM:** **How would psychology test the claim that sugar makes children hyperactive?**

We invite you to think about how we might set up such an experiment. We could, for example, give kids a high-sugar drink and see what happens. But because people often see only what they expect to see, our expectations about sugar and hyperactivity could easily influence our observations. So how could we design an experiment about sugar and hyperactivity that also accounts for our expectations? It is not an easy problem, but we will think it through together, and by the end of this chapter, you will have the tools you need to solve it.

Every chapter in this book will begin with a problem such as this—a problem aimed at getting you actively involved in learning psychology and thinking critically about some important concepts in the chapter. Solving the problem with us, rather than just passively reading the words, will make the concepts more meaningful to you and more easily remembered (which we know is true, thanks to research on the psychology of memory).

The important concept illustrated by the "sugar high" problem is one of the most fundamental concepts in all of psychology: using the *scientific method* to explore the mind and behavior. But before we get into the details of the scientific method, let's clarify what we mean by the term *psychology* itself.

Key Question: What Is Psychology—and What Is It *NOT?*

> **Core Concept 1.1**
>
> **Psychology is a broad field, with many specialties, but fundamentally psychology is the science of behavior and mental processes.**

"I hope you won't psychoanalyze me," says the student at the office door. It is a frequent refrain and an occupational hazard for professors of psychology. But students need not worry about being psychoanalyzed, for two reasons. First, not all psychologists diagnose and treat mental problems—in fact, those who do are actually in the minority among professors of psychology. Second, only a few psychologists are actually *psychoanalysts.* The term **psychoanalysis** refers to a highly specialized and relatively uncommon form of therapy. You will learn more about the distinction between psychologists and psychoanalysts later in the chapter—but, in the meantime, don't fret that your professor will try to find something wrong with you. In fact, your professor is much more likely to be interested in helping you learn the material than in looking for signs of psychological disorder.

So, you might wonder, if psychology is not all about mental disorders and therapy, what *is* it all about?

The term **psychology** comes from *psyche,* the ancient Greek word for "mind," and the suffix *-ology,* meaning "a field of study." Literally, then, *psychology* means "the study of the mind." Most psychologists, however, use the broader definition given in the core concept for this section:

> Psychology is a broad field, with many specialties, but fundamentally psychology is the science of behavior and mental processes.

One important point to note about this definition: Psychology includes not only *mental processes* but also *behaviors.* In other words, psychology's domain covers *internal* mental processes that we observe only indirectly (such as thinking, feeling, and desiring), as well as *external,* observable behaviors (such as talking, smiling, and running). A second important part of our definition concerns the *scientific* component of psychology. In brief, the science of psychology is based on objective, verifiable evidence—not just the opinions of experts and authorities, as we often find in nonscientific fields. We will give a more complete explanation of the science of psychology later in this chapter. For now, though, let's take a closer look at what psychologists actually do.

By the end of this section, you will be able to:

1.1 Describe the different specialties that comprise psychology

1.2 Distinguish psychology from pseudo-psychology

1.1: Psychology: It's More Than You Think

Objective: Describe the different specialties that comprise psychology

Psychology covers more territory than most people realize. As we have seen, not all psychologists are therapists. Many work in education, industry, sports, prisons, government, churches and temples, private practice, human relations, advertising, and the psychology departments of colleges

and universities. Others work for engineering firms, consulting firms, and the courts (both the judicial and the NBA variety) (see Figure 1.1).

Figure 1.1 Work Setting of Psychologists

Psychologists work in a broad variety of industries and work places.
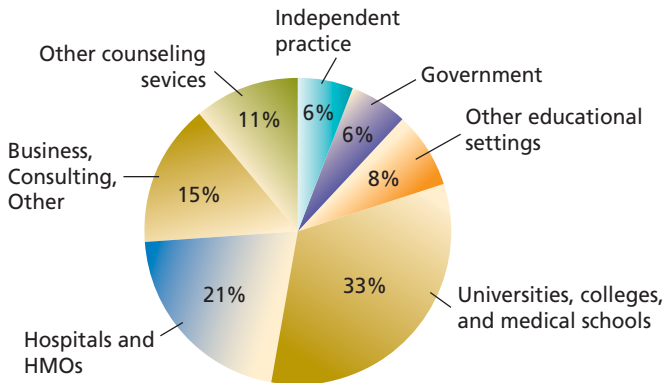
In these diverse settings, psychologists perform a wide range of tasks, including teaching, research, testing, and equipment design—as well as psychotherapy. In fact, psychology's specialties are too numerous to cover them all here, but we can give you a taste of the field's diversity by first dividing psychology into three broad groups.

1.1.1: Three Ways of Doing Psychology

Broadly speaking, psychologists cluster into three main categories:

1. *Experimental psychologists*
2. *Teachers of psychology*
3. *Applied psychologists*

Some overlap exists among these groups, however, because many psychologists take on multiple roles in their work.

Experimental psychologists (sometimes called *research psychologists*) constitute the smallest of the three groups. Nevertheless, they perform most of the research that creates new psychological knowledge (Frincke & Pate, 2004).[1] For example, an experimental psychologist would be well equipped to study the effects of sugar on hyperactivity in children. While some experimental psychologists can be found in industry or private research institutes, the majority work at a college or university, where most also teach.

[1]Throughout this text, you will find citations in parentheses, calling your attention to a complete bibliographic reference found in the references section at the end of the book. These brief in-text citations give the authors' last names and the publication date. When you have the complete references in hand, your library can help you find the original source.

Teachers of psychology can be found at universities, 2-year and 4-year colleges, and high schools. Traditionally, university and college teachers are also required to engage in research and publication, so they serve in a dual role as both teachers of psychology and experimental psychologists. At community colleges, teachers of psychology focus more exclusively on teaching, although some do conduct a limited amount of research as well (typically as a secondary pursuit). Teachers at high schools rarely—if ever—are required to conduct research (American Psychological Association, 2007; Johnson & Rudmann, 2004).

Applied psychologists use the knowledge developed by experimental psychologists to tackle human problems of all kinds, such as toy or equipment design, criminal analysis, and psychological treatment. They work in a wide variety of places, ranging from schools, clinics, and social service agencies to factories, airports, hospitals, and casinos. All told, about two-thirds of the doctoral-level psychologists in the United States work primarily as applied psychologists (Wicherski and others, 2009).

1.1.2: Applied Psychological Specialties

Some of the most popular applied specialties include:

- *Industrial and organizational psychologists* (often called *I/O psychologists*) specialize in personnel selection, talent management, and in tailoring the work environment to maximize both productivity and morale. One of the fastest-growing fields of psychology, I/O psychologists work for companies both large and small around the world. They may, for example, develop programs to motivate employees or to improve managers' leadership skills. I/O psychologists also conduct market research, provide employee and management coaching, conduct employee satisfaction surveys, and help employees create a better balance between work and their personal lives (Novotney, 2011; Shrader, 2001).

- *Sports psychologists* help athletes improve their performance by planning effective practice sessions, enhancing motivation, and learning to control emotions under pressure. Some focus exclusively on professional athletes, and others work with recreational athletes. Still others work with individuals for whom physical activity is a key element of their job, such as firefighters or certain military personnel. In all of these cases, the goal of the psychologist is to help their clients maximize their performance by overcoming whatever psychological barriers may be present. Sports psychologists may also conduct research to better understand the relationship between psychology and performance—for example, by studying how various types of personalities may increase interest in

high-risk endeavors such as firefighting, parachuting, or scuba diving.

- *School psychologists* are experts in teaching and learning. They deal with issues impacting learning, family or personal crises influencing school performance, or social conditions such as gangs, teen pregnancy, or substance abuse. They sometimes diagnose learning or behavioral problems and work with teachers, students, and parents to help students succeed in school. Many school psychologists work for school districts, where their work includes administering, scoring, and interpreting psychological tests.

- *Clinical and counseling psychologists* help people work through difficult choices in relationships, careers, or education to improve social and emotional adjustment. Almost half of all doctoral-level psychologists list clinical or counseling psychology as their specialty (Wicherski and others, 2009).

- *Forensic psychologists* provide psychological expertise to the legal and judicial system. One of the most recently recognized specialties in psychology, forensic psychology has gained rapid popularity due in part to such TV shows as *Criminal Minds* and *CSI.* And, while a real day in the life of forensic psychologists may not be as glamorous or fast paced as their television counterparts', the field is burgeoning with opportunities. Forensic psychologists may test inmates in prisons or forensic hospitals to determine readiness for release or fitness to stand trial, evaluate testimony in cases of rape or child abuse, or help with jury selection (Clay, 2009b; Huss, 2001).

- *Environmental psychologists* aim to improve human interaction with our environment. They may, for example, study the impact of inner-city garden spaces on children's academic performance or determine ways to encourage environmentally friendly behavior such as recycling. In private practice, environmental psychologists sometimes help clients maintain their commitment to sustainability or conduct workshops teaching people the mental health benefits of interacting with nature (Novotney, 2009).

- *Geropsychologists* make up one of the newest fields of psychology. With the rapidly increasing population of adults over 65 in the U.S., the American Psychological Association established professional geropsychology to help older adults maintain their health and wellness and cope effectively with age-related challenges. Geropsychologists conduct assessments, provide interventions, and consult with families, caregivers, and medical professionals to help older adults maximize their potential in the later stages of life.

More information on career possibilities in psychology can be found in *Careers in Psychology,* published by the American Psychological Association (2011a) and available online.

1.1.3: Psychology Is Not Psychiatry

Just as beginning psychology students may think all psychologists are clinical psychologists, they also may not know the distinction between *psychology* and *psychiatry.* So let's clear up that confusion, just in case you encounter a test question on the topic.

Virtually all psychiatrists, but only some psychologists, treat mental disorders—and there the resemblance ends. **Psychiatry** is a medical specialty, not part of psychology at all. Psychiatrists hold MD (Doctor of Medicine) degrees and, in addition, have specialized training in the treatment of mental and behavioral problems, typically with drugs. Therefore, psychiatrists are licensed to prescribe medicines and perform other medical procedures. Consequently, psychiatrists tend to treat patients with more severe mental disorders (such as schizophrenia) and also to view patients from a *medical* perspective, as persons with mental "diseases."

By contrast, psychology is a much broader field that encompasses the whole range of human behavior and mental processes, from brain function to social interaction and from mental well-being to mental disorder. For most psychologists, graduate training emphasizes research methods, along with advanced study in a specialty such as those listed earlier. Moreover, while psychologists usually hold doctoral degrees, their training is not usually *medical* training, and thus they are not generally licensed to prescribe medications. Recently, however, a few states have passed legislation to allow qualified psychologists to prescribe certain medications, subject to completing some advanced training and certification (APA, 2014). In summary, then, psychologists work in a wide variety of fields, all of which view people from a *psychological* perspective. This perspective is illustrated by clinical and counseling psychologists, who are likely to view the people they are helping as clients rather than as patients.

So, now you know that psychiatry is not psychology. Next, we'll look at something else that often gets confused with psychology: **pseudo-psychology**.

1.2: Thinking Critically About Psychology and Pseudo-Psychology

Objective: Distinguish between psychology and pseudo-psychology

Popular movies such as *Lucy* and the *X-Men* series continue a long tradition of entertainment that thrives on viewers' fascination with claims of mysterious powers of the mind and supernatural influences on our behavior.

Your daily horoscope does the same thing—never mind that astrology has been thoroughly debunked (Schick & Vaughn, 2001). Neither is there any factual basis for graphology (the bogus science of handwriting analysis), fortune telling, or the supposed power of subliminal messages to make us buy things. All these fall under the heading of **pseudo-psychology**: unsupported psychological beliefs masquerading as scientific truth.

The supernatural powers of the X-Men's Professor X, played here by Sir Patrick Stewart, may be fun to imagine—but have no basis in science.

Certainly paranormal claims and horoscopes can be fun as pure entertainment, but it is important to know where reality ends and fantasy begins. After all, you wouldn't want to stake an important decision about your health or welfare on false information, would you? Thus, one of the goals of this text is to help you *think critically* when you hear extraordinary claims about behavior and mental processes. And, lest you assume that by "critical thinking" we simply mean you should find ways to criticize, let us clarify what we do mean when we use this important term.

1.2.1: What Is Critical Thinking?

Those who talk about **critical thinking** often find themselves in the position of Supreme Court Justice Potter Stewart, who famously was unable to define pornography but concluded, "I know it when I see it." Like Justice Stewart, your fearless authors (Phil, Bob, and Vivian) cannot offer a definition of critical thinking with which everyone will agree. Nevertheless, we are willing to jump into the fray with a list of six **critical thinking skills** we will emphasize in this text. Each is based on a specific question we believe should be asked when confronting new ideas.

1. What is the source?
2. Is the claim reasonable or extreme?
3. What is the evidence?
4. Could bias contaminate the conclusion?
5. Does the reasoning avoid common fallacies?
6. Does the issue require multiple perspectives?

WHAT IS THE SOURCE?   Does the person making the claim have real expertise in the field? Suppose, for example, you hear a newscast on which a politician or pundit declares that juvenile lawbreakers can be "scared straight." The story explains that, in the program, first-time offenders receive near-abusive treatment from felons who try to scare them away from a life of crime with tales of harsh prison life. Such programs have, in fact, been tried in many states of the U.S. and some other countries as well (Petrosino and others, 2013). But does the person making the claim have any real knowledge of the subject? Does the claimant have legitimate credentials, or is he or she merely a self-proclaimed "expert?" One way to find out is to go online and examine the individual's references and standing within the field. Also, find out whether the source has something substantial to gain from the claim. If it's a medical breakthrough, for example, does the claimant stand to make money from a new drug or medical device? In the case of a "scared straight" program, is the source trying to score political points, get votes, or promote a television series?
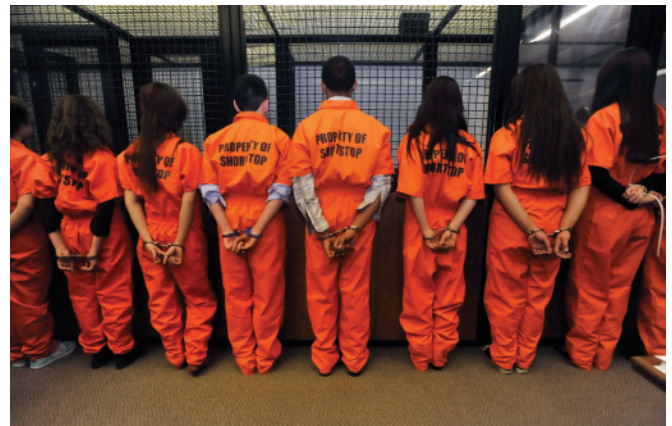
Scared straight programs may appeal to desperate parents, but research shows they are not effective—in fact, they may actually increase delinquency. Applying our six critical thinking guidelines to this and other popular claims will help you be a smarter and more informed consumer of information.

IS THE CLAIM REASONABLE OR EXTREME?   Life is too short to be critical of everything, of course, so the key is to be selective. How? As the famous astronomer Carl Sagan once said about reports of alien abductions, "Extraordinary claims require extraordinary evidence" (Nova Online, 1996). Critical thinkers, then, are skeptical of claims touted as "breakthroughs" or "revolutionary." Certainly, there are occasionally breakthroughs or revolutionary new treatments that work—but they are relatively rare. Most new scientific developments are extensions of existing knowledge. So, claims that conflict with well-established knowledge should raise a red flag. For example, beware of ads that promise to help you quit smoking

or lose weight with little or no effort. In the case of "scared straight" programs or any other quick fix for a difficult problem, remember that simple solutions to complex problems rarely exist.

WHAT IS THE EVIDENCE? This is one of the most important guidelines to critical thinking, and you will learn more about what constitutes scientific evidence elsewhere in this chapter. For now, though, beware of **anecdotal evidence** or testimonials proclaiming the dramatic effects of a new program. These first-hand accounts tend to be quite convincing, so they often lure us into believing them. Testimonials and anecdotes, though—no matter how compelling—are not *scientific evidence.* They merely represent the experiences of a few carefully selected individuals. It would be risky, and perhaps even dangerous, to assume that what seems true for some people must also be true for everyone.

What does the evidence say about "scared straight" programs? Unequivocally, they do not work. In fact, a great deal of scientific evidence indicates that teens exposed to such treatments, on average, subsequently get into *more* trouble than do those not given the "scared straight" treatment (Petrosino and others, 2012). Moreover, the U.S. Department of Justice has strongly cautioned against these programs, emphasizing the harm they cause (Robinson & Slowikowski, 2011).

COULD BIAS CONTAMINATE THE CONCLUSION? Critical thinkers know the conditions under which biases are likely to occur and can recognize common types of bias, many of which we will cover throughout this book. For now, though, let's examine just a few.

The form of bias most applicable to our "scared straight" example is **emotional bias**: Many worried parents continue to contact law enforcement to request that their teens be enrolled in such a program, saying they're at their wits' end and don't know where else to turn. Desperate for help, they rely on popular media and what they see on television for guidance, rather than thinking clearly and seeking alternate programs that do have evidence of success (Yu, 2014). Also, people's general fear of crime and criminals may prompt support for harsh consequences, as evidenced by the recent spate of "three strikes" laws (which mandate a lifetime in prison after three felony convictions).

Another common form of bias is **confirmation bias**, the all-too-human tendency to remember events that confirm our beliefs and ignore or forget contradictory evidence (Halpern, 2002; Nickerson, 1998). For example, confirmation bias explains why people persist in their beliefs that astrology works: They remember the predictions that seemed accurate and forget the ones that missed the mark. Confirmation bias also explains

why gamblers have better recollections of their wins than of their losses, or why we persist in thinking a particular object is our lucky charm. Amazingly, recent research reveals that this bias may be partly biological in nature. In a study done before a presidential election, people listened to their favorite politicians making statements that contradicted themselves. Upon hearing the contradictory statement, brain circuits associated with reasoning in the listeners suddenly shut down, while brain regions most involved with emotion remained active (Shermer, 2006; Westen and others, 2006). It was as though the brain was saying, "I don't want to hear anything that conflicts with my beliefs." Thus, we may have to exert extra effort and diligence to overcome this bias.

DOES THE REASONING AVOID COMMON FALLACIES? We will study several common logical fallacies in this book, but the one most applicable to the "scared straight" example is the assumption that common sense is a substitute for scientific evidence. In fact, in many cases common sense exists to support both sides of an issue. For example, we hear that "Birds of a feather flock together"—but we also hear that "Opposites attract." Similarly, we are told that "The early bird gets the worm," but aren't we also cautioned that "Haste makes waste?" Which, then, is true? Only an examination of the evidence can reliably provide the answer.

A second example of a logical fallacy is when we assume that, because two things are related, once must cause the other. This is known as the **correlation-causation fallacy**. For example, did you know that murder rates rise when people eat more ice cream? It's true—clear data supports the connection. It would be silly, though, to assume that eating ice cream makes people kill each other! (Want to know what's really driving this correlation? Think of something that might influence both ice cream consumption and aggression.) Yet, as humans driven to explain things, we commonly draw these erroneous conclusions when we hear, say, that autism rates have risen as more children have been vaccinated. Instead, we must consider alternative interpretations of the relationship and seek additional evidence.

DOES THE ISSUE REQUIRE MULTIPLE PERSPECTIVES? Most behavioral problems and social issues that concern us are complex and need to be viewed from multiple perspectives in order to gain a complete understanding. Critical thinkers, then, know better than to accept a notion that focuses exclusively on one angle. The "scared straight" intervention, for example, makes the simplistic assumption that fear of punishment is the best deterrent to delinquency. A more complete view recognizes additional contributors to delinquency. Psychologists, for example,

may look at delinquency as a product of learned behaviors, social influence, or personality traits. Economists would be interested in the financial incentives for delinquency. And sociologists would focus on such things as gangs, poverty, and community structures. Surely such a multifaceted problem will require a more complex solution than threats of punishment.

Thinking Critically About the Chapter Problem

Before moving on, ask yourself this:

How would you apply these critical thinking guidelines to the chapter-opening problem about whether sugar makes children hyperactive?

1. First, *consider the source.*

   Is the mother of an 8-year-old an expert on biological effects of sugar? Assuming she is not, you'd have to wonder if the source of her belief is a reliable one or if she is just repeating some "common sense" she's often heard but never questioned.

2. Second, *examine the evidence.*

   Have scientific tests been conducted to measure the effects of sugar on children? If so, what have they revealed?

3. Third, *could any biases be at work?*

   The **confirmation bias**, for example, would suggest that we are likely to remember the times our kids had sugar and became hyperactive, and forget or not notice situations when they consumed sugar but it didn't affect them. Also, if we expect children to be hyperactive after consuming sugar, that is likely what we will observe, according to the **expectancy bias.**

4. Fourth, *is the claimant avoiding common fallacies in reasoning?*

   In this case, even if we can prove that kids who consume more sugar are more hyperactive, we can't be sure that sugar is the cause, as the relationship is a correlation (which does not show a cause–effect relationship). Alternatively, perhaps kids who are already hyperactive eat more sugar as a means of maintaining their high need for activity. Or, it's the excitement of the party that prompts the hyperactivity, but the sugar gets the blame. Identifying these possibilities helps overcome the **correlation-causation fallacy.**

5. What other perspectives should be considered?

   Finally, the need to recognize multiple perspectives prompts us to admit that there are probably other reasons kids get excited at parties. For example, parents may allow their children more flexibility in behavior at parties, and the general nature and social norms of children's parties practically requires energetic games.

Do It Yourself!
Psychological Science or Psychobabble?

Now, let's put a sampling of your psychological beliefs to the test. Some of the following statements are true, and some are false. Don't worry if you get a few—or all—of the items wrong: You will have lots of company. The point is that what so-called common sense teaches us about psychological processes may not withstand the scrutiny of a scientific test. Analyze each of the following statements as "true" or "false."

1. _____ It is a myth that most people use only about 10% of their brains.
2. _____ During your most vivid dreams, your body may be paralyzed.
3. _____ Psychological stress can cause physical illness.
4. _____ The color red exists only as a sensation in the brain. There is no "red" in the world outside the brain.
5. _____ Bipolar (manic–depressive) disorder is caused by a conflict in the unconscious mind.
6. _____ The newborn child's mind is essentially a "blank slate" on which everything he or she will know must be "written" (learned) by experience.
7. _____ Everything that happens to us leaves a permanent record in memory.
8. _____ You were born with all the brain cells that you will ever have.
9. _____ Intelligence is a nearly pure genetic trait that is fixed at the same level throughout a person's life.
10. _____ Polygraph ("lie detector") devices are remarkably accurate in detecting physical responses that, in the eye of a trained examiner, reliably indicate when a suspect is lying.

The first four items are true; the rest are false.

Here are some brief explanations for each item. You will learn more detail about each of these myths as you continue your study of psychology.

1. True: This is a myth. We use all parts of our brains every day.
2. True: During our most vivid dreams, which occur during rapid eye movement sleep (REM), the voluntary muscles in our body are paralyzed, with the exception of those controlling our eyes.
3. True: The link between mind and body can make you sick when you are under chronic stress.
4. True: Strange as it may seem, all sensations of color are created in the brain itself. Light waves do have different *frequencies*, but they have no color. The brain interprets the various frequencies of light as different colors.
5. False: There is no evidence at all that unconscious conflicts play a role in bipolar disorder. Instead, the evidence suggests a strong biochemical component. The disorder usually responds well to certain drugs, hinting that it

involves faulty brain chemistry. Research also suggests that this faulty chemistry may have a genetic basis.

6. False: Far from being a "blank slate," the newborn child has a large repertoire of built-in abilities and protective reflexes. The "blank slate" myth also ignores the child's genetic potential.

7. False: Although many details of our lives are remembered, there is no evidence that memory records all the details of our lives. In fact, we have good reason to believe that most of the information around us never reaches memory and that what does reach memory often becomes distorted.

8. False: Contrary to what scientists thought just a few years ago, some parts of the brain continue to create new cells throughout life.

9. False: Intelligence is the result of both heredity and environment. Because it depends, in part, on environment, your level of intelligence (as measured by an IQ test) can change throughout your life.

10. False: Even the most expert polygrapher can incorrectly classify a truth-teller as a liar or fail to identify someone who is lying. Objective evidence supporting the accuracy of lie detectors is meager.

Psychology Matters

Psychology as a Major

By now, you may be thinking, "Hey, psychology sounds pretty interesting. . . . Should I consider majoring in it?" A degree in psychology is useful in many ways, whether you want to become a psychologist or not. The entire goal of psychology is to better understand why people do what they do, so even taking a few classes in psychology will give you insight into yourself and others in your life. Earning an associate's degree or a bachelor's degree in psychology can help prepare you for jobs as a psychological aide or technician in agencies, hospitals, nursing homes, and rehabilitation centers. A bachelor's degree in psychology, coupled with training in business, government, journalism, or education, is also excellent preparation for a career in any of these fields.

Becoming a fully fledged psychologist, though, requires substantial training beyond the bachelor's degree. In graduate school, the psychology student takes advanced classes in one or more specialized areas while developing general skills as a scholar and researcher. A master's degree, typically requiring 2 years of study beyond the bachelor's level, may qualify you for employment as a psychology instructor at the high school or community college level or as an applied psychologist in certain specialties, such as counseling. Master's-level psychologists are common in human service agencies, as well as in private practice (although many states do not allow them to advertise themselves as "psychologists").

The widest range of choices is available to holders of a doctorate (Smith, 2002b), such as a PhD (Doctor of Philosophy),

a PsyD (Doctor of Psychology), or an EdD (Doctor of Education). In most states, a license to practice psychology requires a doctorate plus a supervised internship. A doctoral degree also qualifies you for college and university teaching, for research positions, and for many of the specialties such as forensic psychology that we introduced to you earlier in this section. You could even work as a video game researcher, making video games more accessible and fun! Check out the story of one PhD graduate who did just that. http://www.apa.org/science/about/psa/2009/11/careers.aspx

Key Question: What Are Psychology's Six Main Perspectives?

Core Concept 1.2

Six main viewpoints dominate modern psychology—the biological, cognitive, behavioral, whole-person, developmental, and sociocultural perspectives—each of which grew out of radical new concepts about mind and behavior.

The shape of modern psychology has been molded by its history, which dates back some 25 centuries to the Greek philosophers Socrates, Plato, and Aristotle. These sages not only speculated about consciousness and madness; they also knew that emotions could distort thinking and that our perceptions are merely interpretations of the external world. Even today, people would probably agree with many of these ancient conjectures—and so would modern psychology.

But the Greeks get only partial credit for laying the foundations of psychology. At roughly the same time, Asian and African societies were developing their own psychological ideas. In Asia, followers of yoga and Buddhism were exploring consciousness, which they attempted to control with meditation. Meanwhile, in Africa, other explanations for personality and mental disorders were emerging from traditional spiritual beliefs (Berry and others, 1992). It was, however, the Greek tradition and, later, the Catholic Church that most influenced the winding developmental path of Western psychology as a science.

What role did the Church play in shaping the study of psychology? During medieval centuries, for example, clerics actively suppressed inquiry into human nature, partly in an attempt to discourage interest in the "world of the flesh." For medieval Christians, the human mind and soul were inseparable and—like the mind of God—presented a mystery that mortals should never try to solve.

Change of this entrenched viewpoint did not come easily. It took a series of radical new ideas, spaced over several hundred years, to break the medieval mindset and lay

the intellectual foundation for modern psychology—which brings us to our core concept for this section:

> Six main viewpoints dominate modern psychology—the biological, cognitive, behavioral, whole-person, developmental, and sociocultural perspectives—each of which grew out of radical new concepts about mind and behavior.

As we examine these perspectives, you will see that each viewpoint offers its own unique explanation for human behavior. Taken together, they comprise psychology's multiple perspectives, each of which will become an important tool in your "psychological toolbox" for understanding human behavior. To help you see for yourself how useful these perspectives can be, we will apply each one to a problem with which many students struggle: procrastination. Let's begin with the biological perspective.

By the end of this section, you will be able to:

1.3 **Explain the biological perspective**

1.4 **Describe the developmental history of scientific psychology and the modern cognitive perspective**

1.5 **Summarize the psychological perspectives that emerged in the twentieth century**

1.6 **Apply psychology's perspectives to a behavior of your own**

1.3: The Separation of Mind and Body

Objective: **Explain the biological perspective**

The 17th-century philosopher René Descartes *(Day-CART)* proposed the first radical new concept that eventually led to modern psychology: *a distinction between the spiritual mind and the physical body.* The genius of Descartes' insight was that it allowed the Church to keep the mind off limits for scientific inquiry, while simultaneously permitting the study of human sensations and behaviors because they were based on physical activity in the nervous system. His proposal fit well with exciting new discoveries about biology, in which scientists had just learned how the sense organs of animals convert stimulation into nerve impulses and muscular responses. Such discoveries, when combined with Descartes' separation of mind and body, allowed scientists to demonstrate that biological processes, rather than mysterious spiritual forces, caused sensations and simple reflexive behaviors.

1.3.1: The Modern Biological Perspective

Four hundred years later, Descartes' revolutionary perspective provides the basis for the modern **biological perspective**. No longer constrained by the dictates of the medieval Church, however, modern biological psychologists have rejoined mind and body (although they leave issues of the soul to religion), and now view the mind as a product of the brain.

In this current view, our personalities, preferences, behavior patterns, and abilities all stem from our physical makeup. Accordingly, biological psychologists search for the causes of our behavior in the brain, the nervous system, the endocrine (hormone) system, and the genes. Procrastination, from this perspective, may result from a certain type of brain chemistry (Liu and others, 2004), which could be inherited. While they don't deny the value of other perspectives on mind and behavior, biological psychologists aim to learn as much as possible about the physical underpinnings of psychological processes.

The biological perspective in psychology looks for causes of human behavior in our brain and nervous system. The fields of neuroscience and evolutionary psychology are both offshoots of the biological perspective.

1.3.2: Two Variations on the Biological Theme

As you might imagine, the biological view has strong roots in medicine and biological science. In fact, the emerging field of **neuroscience** combines biological psychology with biology, neurology, and other disciplines interested in brain processes. Thanks to spectacular advances in computers and brain-imaging techniques, neuroscience is a hot area of research. Among their achievements, neuroscientists have learned how damage to certain parts of the brain can

destroy specific abilities, such as speech, social skills, or memory. Neuroscience and brain imaging also offer fascinating glimpses into the hidden world of sleep and dreams, into the effects of drugs on our brain, and into other states of consciousness.

Another important variant of biological psychology sprouted recently from ideas proposed by Charles Darwin some 150 years ago. **Evolutionary psychology** holds that much human behavior arises from inherited tendencies, and the field has gained a substantial boost from the recent surge of genetics research. In the evolutionary view, our genetic makeup—underlying our most deeply ingrained behaviors—was shaped by conditions our remote ancestors faced thousands of years ago.

According to evolutionary psychology, environmental forces have pruned the human family tree, favoring the survival and reproduction of individuals with the most adaptive mental and physical characteristics. Darwin called this process **natural selection**. Through it, the characteristics of our species have evolved (changed) toward those that provided a competitive advantage. Our advanced human language system, the jealousy we feel at the thought of our mate cheating on us, and our tendency to align ourselves with our families in times of strife all increase our ability to survive and thrive and to perpetuate our lineage, and serve as just a few examples of the evolutionary psychology perspective.

Some proponents of evolutionary psychology have made highly controversial claims, however. In their view, even the most undesirable human behaviors, such as warfare, rape, and infanticide, may have grown out of biological tendencies that once helped humans adapt and survive (Buss, 2008). This approach also proposes biological explanations for certain gender differences—why, for instance, men typically have more sexual partners than do women.

Evolutionary psychology aims to explain behavior by figuring out how that behavior could have been adaptive (beneficial to survival) to earlier humans. With that in mind, can you think of an evolutionary psychology explanation for procrastination—in other words, is there a way procrastination may have helped earlier humans survive and/or thrive?

1.4: The Founding of Scientific Psychology

Objective: Describe the developmental history of scientific psychology and the modern cognitive perspective

Another radical idea that shaped the early science of psychology came from chemistry, where scientists had developed the famous periodic table after noticing patterns in properties of the chemical elements. At one stroke, the periodic table made

Figure 1.2 Wilhelm Wundt in the First Psychology Laboratory

The periodic table of the chemical elements inspired Wilhelm Wundt to consider how the human mind might be broken down into a similar framework of common elements.
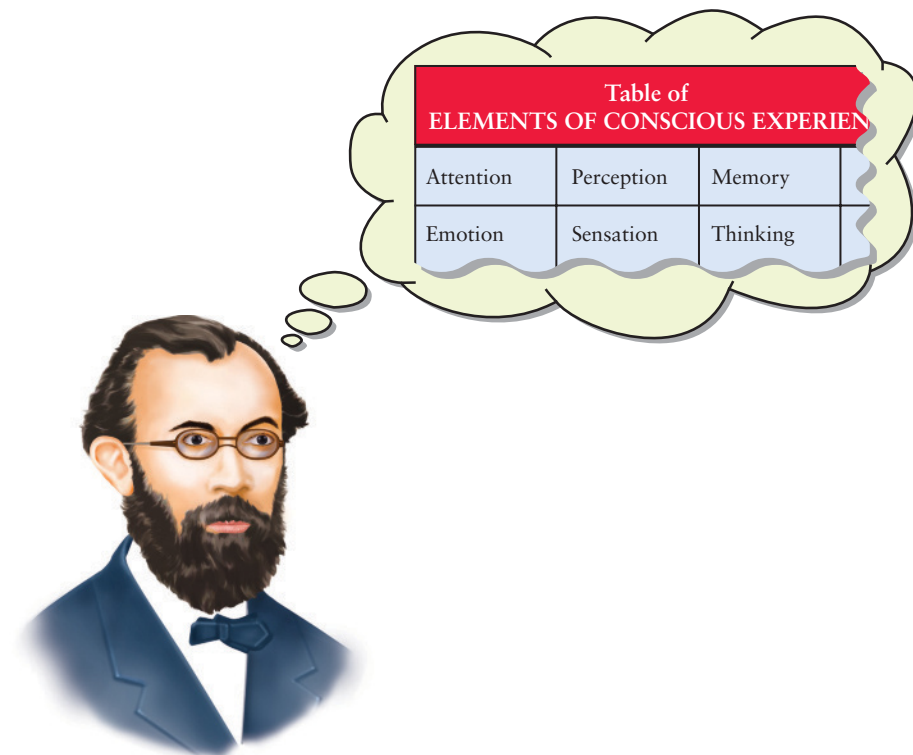
the relationships among the elements clear. Wilhelm Wundt, a German scientist (who, incidentally, became the first person to call himself a "psychologist") wondered if he could simplify the human psyche in the same way the periodic table had simplified chemistry. Perhaps he could discover the "elements" of conscious experience! Although Wundt never realized his dream of a periodic table for the mind, he did have this breakthrough insight:

> *The methods of science used to objectively measure and study the natural world, such as in chemistry or physics, could be used to study the mind and body as well.*

1.4.1: Wundt's Quest for the Elements of Consciousness

"Please press the button as soon as you see the light," Professor Wundt might have said, as he prepared to record the reaction time between the light stimulus and a student's response. Such simple yet concrete experiments were common fare in 1879 in the world's first psychology laboratory at the University of Leipzig. There, Wundt and his students also performed studies in which trained volunteers described their sensory and emotional responses to various stimuli, using a technique called **introspection**. These were history's first psychology experiments: studies of what Wundt and his students proposed to be the basic "elements" of consciousness, including sensation and perception, memory, attention, emotion, thinking, learning, and language. All our mental activity, they asserted, consists of different combinations of these basic processes.

1.4.2: Wundt's Structuralist Legacy

Wundt's pupil Edward Bradford Titchener brought the quest for the elements of consciousness to America, where Titchener began calling it **structuralism**. Titchener's term was fitting, because his goal—like that of Wundt—was to reveal the most basic "structures" or components of the mind (Fancher, 1979). So, even though Wundt never used the term, he is considered the father of structuralism.

From the outset, both Wundt and Titchener became magnets for critics. Objections especially targeted the introspective method as being too subjective. After all, said the critics, how can we judge the accuracy of people's descriptions of their thoughts and feelings?

But Wundt and Titchener have had the last laugh. Even though psychologists sometimes view their ideas as quaint, they still rely on updated versions of the old structuralist methods. Further, we think that Wundt and Titchener, if they were alive today, would still be laughing for one more reason: The topics they first identified and explored can be found as chapter headings in every introductory psychology text—including this one. Experience introspection for yourself, firsthand, in this Do It Yourself! activity.

Do It Yourself!
An Introspective Look at the Necker Cube

The cube in Figure 1.3A will trick your eye—or, more accurately, it will trick your brain. Look at the cube for a few moments, and suddenly it will seem to change perspectives. For a time it may seem as if you were viewing the cube from the upper right (see Figure 1.3B). Then, abruptly, it will shift and appear as though you were seeing it from the lower left (see Figure 1.3C).

Figure 1.3 Different Perspectives of the Necker Cube

Gaze at Figure 1.3A steadily. After a few moments, did it seem to change perspectives? How can psychology help us understand this phenomenon?
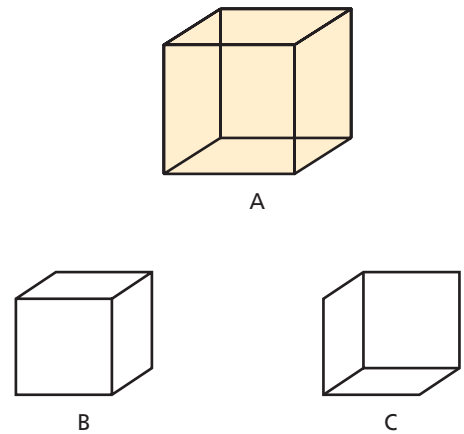
It may take a little time for the cube to shift the first time. But once you see it change, you won't be able to prevent it from alternating back and forth, seemingly at random. Try showing the cube to a few friends and asking them what they see. Do they see it shifting perspectives, as you do?

This phenomenon was not discovered by a psychologist. Rather, Louis Necker, a Swiss geologist, first noticed it nearly 200 years ago while looking at cube-shaped crystals under a microscope. Despite its origins, Necker's amazing cube illustrates two important points relative to our study of psychology:

1. First, it illustrates the much-maligned process of *introspection*, pioneered by Wundt and his students. You will note that the only way we can demonstrate that the Necker cube changes perspectives in our minds is by introspection: having people look at the cube and report what they see. And why is this important to psychology? Only the most hard-core behaviorists would deny that something happens mentally within a person looking at the cube. In fact, the Necker cube demonstrates that we add meaning to our sensations—a process called *perception*.

2. The second important point is this: The Necker cube serves as a metaphor for the multiple perspectives in psychology. Just as there is no single right way to see the

cube, there is no single perspective in psychology that gives us the whole "truth" about behavior and mental processes. Put another way, if we are to understand psychology fully, we must alternately shift our viewpoints among multiple perspectives.

1.4.3: Gestalt's Response "The Whole, not the Parts"

Germany was a hotbed of psychological interest and study in the early twentieth century, and one prominent group of theorists took issue with the structuralists' emphasis on the elements of consciousness. Instead, this group believed that consciousness went far beyond simple sensory experience, and argued that our experiences could not be reduced to a set of discrete elements. These **Gestalt psychologists**, as they came to be known, focused then on the whole of our conscious experience as more than the sum of its parts, and sought to understand how we construct "perceptual wholes." (*Gestalt*, incidentally, is the German word for "whole" or "configuration.") How do we, for example, form the perception of a face from its component lines, shapes, colors, and textures?

Figure 1.4 Gestalt Psychology: The Whole Is More Than the Sum of Its Parts

What do you see? Even though the lines aren't all connected, our minds unconsciously fill in gaps so most people see a bear. This illustrates the Gestalt principle of closure, and the Gestalt theorists' belief that the whole of our conscious experience is more than simply the sum of its parts.

1.4.4: James and the Functionalist Rebellion

Another of Wundt's most vocal critics, the American psychologist William James, argued that the structuralist approach was far too narrow. (James also said it was boring—which

didn't help his already strained relationship with Wundt.) Psychology should include the *function* of consciousness, not just its structure, James argued. Appropriately, his brand of psychology led to a "school"[2] that became known as **functionalism** (Fancher, 1979).

James and his followers found Charles Darwin's ideas far more interesting than Wundt's. Like Darwin, James had a deep interest in emotion that included its relation to the body and behavior (not just as an element of consciousness, as in Wundt's system). He also liked Darwin's emphasis on organisms *adapting* to their environments. James therefore proposed that psychology should explain how people adapt—or fail to adapt—to the real world outside the laboratory.

The functionalists, then, became the first **applied psychologists**—examining how psychology could be used to improve human life. James himself wrote extensively on the development of learned "habits," the psychology of religion, and teaching. He is also thought to be the first American professor ever to ask for student evaluations (Fancher, 1979). His follower, John Dewey, founded the "progressive education" movement, which emphasized learning by *doing* rather than by merely listening to lectures and memorizing facts.

Introspection was the point on which structuralism and functionalism agreed. Ironically, their point of agreement was also their greatest point of vulnerability: The introspective method was subjective, leaving them vulnerable to criticism that their versions of psychology were not really scientific. Solving that problem took more than half a century and the cooperation of experts from several disciplines who came together to form the modern *cognitive perspective.*

1.4.5: The Modern Cognitive Perspective

The development of the computer—which became the new metaphor for the mind—gave psychology an irresistible push toward a new synthesis: the modern **cognitive perspective**. Following in the tradition of its structuralist, functionalist, and Gestalt ancestors, this perspective emphasizes cognition, or mental activity, such as perceptions, interpretations, expectations, beliefs, and memories. From this viewpoint, a person's thoughts and actions are the result of the unique cognitive pattern of perceptions and *interpretations* of her experiences.

In contrast to its predecessors, today's cognitive perspective boasts more objective methods of observation,

---

[2] The term "school" refers to a group of thinkers who share the same core beliefs.

thanks to stunning advancements in brain-imaging techniques that allow scientists to view the brain as it engages in various mental processes. Cognitive psychologists interested in how memory works, for example, have identified certain brain patterns related to common types of memory failure—and also discovered methods of improving one's memory. Cognitive psychology is also the field that helps us understand many of the thinking biases that often interfere with rational thinking.

How would cognitive psychologists explain procrastination? What do you think?

First, they might point out that procrastinators often underestimate how long a project might take—illustrating the role of expectations in our behavior patterns. Also, procrastinators may be victims of **confirmation bias** if they remember the times they previously procrastinated yet completed a project on time, while forgetting the deadlines they missed. Finally, people who put things off until the last minute may not interpret their behavior as a problem—perhaps they tell themselves they do their best work under pressure. In all these ways, cognitive psychology sheds light on the internal thinking processes that influence procrastination and other human behaviors.

1.5: Psychological Perspectives Proliferate in the Twentieth Century

Objective: Summarize the psychological perspectives that emerged in the twentieth century

In the twentieth century, the field of psychology really began to grow. Early cognitive theorists such as Wundt and James paved the way for new perspectives, such as the behavioral perspective, that aimed to study psychology using scientific principles. Not to be forgotten, the Gestalt school similarly opened the door for further study of human behavior from a more holistic viewpoint, such as the developmental perspective, and the whole person perspective. And finally, midway through the century, psychologists began to recognize the importance of culture and our situational environment in influencing our behavior. Let's examine each of these four additional perspectives in greater detail.

1.5.1: The Behavioral Perspective Focuses on the Observable and Measurable

Early in the 1900s, a particularly radical and feisty group, known as the behaviorists, made a name for themselves by disagreeing with nearly everyone. Most famously, they proposed the idea that the mind should not be part of psychology at all! John B. Watson, an early leader of the behaviorist movement, argued that a truly objective science of psychology should deal solely with *observable* events: physical *stimuli* from the environment and the organism's overt *responses*. **Behaviorism**, said Watson, is the science of behavior and the measurable environmental conditions that influence it.

Why did behaviorists reject mental processes—such as introspection—as a viable area of scientific study? B. F. Skinner, another influential behaviorist, may have best summarized this perspective when he suggested that the seductive concept of "mind" has led psychology in circles. The mind, he said, is something so subjective that it cannot even be proved to exist (Skinner, 1990). (Think about it: Can you prove you have a mind?) As Skinner noted wryly, "The crucial age-old mistake is the belief that . . . what we feel as we behave is the cause of our behaving" (Skinner, 1989, p. 17). Thus, for the behaviorists, a person's thoughts or emotions were irrelevant—it was only behavior that could be reliably observed and measured. So, instead of studying "fear," behaviorists might observe whether a young child would begin to avoid a white laboratory rat if the rat was paired with a sudden loud sound. Importantly, the behaviorists refrained from making any subjective assumptions about what the outward behavior (avoidance) represented internally (such as fear).

We can summarize the radical new idea that drove behaviorism this way:

> *Psychology should be limited to the study of observable behavior and the environmental stimuli that shape behavior.*

This **behavioral perspective** called attention to the way our actions are modified by their consequences, as when a child is praised for saying "Thank you" or an adult is rewarded for good job performance with a pay raise. The behaviorists contributed greatly to our detailed understanding of environmental forces that impact all kinds of human learning, and they have also given us powerful strategies for changing behavior by altering the environment (Alferink, 2005; Roediger, 2004).

How do you think behaviorists, with their emphasis on reward and punishment, might explain procrastination?

Consider the rewards reaped from putting off something you don't want to do: Instead of the dreaded work, you likely spend the time doing something you enjoy, which is instantly gratifying. Then, when you tackle the problem at the last minute, you get rewarded by the feeling of success when you manage to pull it off

and get it done just in the nick of time! Is it any wonder why procrastination is a difficult behavior to change? Fortunately, behaviorism also offers some effective strategies for overcoming this troublesome pattern.

Using Rewards to Make a Positive Change

Describe a scenario where a troublesome behavior of yours was rewarded. List an alternate, more desirable behavior and a reward you could give yourself to improve your behavior.

▶ `The response entered here will appear in the performance dashboard and can be viewed by your instructor.`

Submit

1.5.2: The Developmental Perspective Emphasizes How We Change

Change may be the only constant in our lives. According to the **developmental perspective**, psychological change results from the interaction between the heredity written in our genes and the influence of our environment. But which counts most heavily: *nature* (heredity) or *nurture* (environment)? As we have seen, biological psychologists emphasize nature, while behaviorists emphasize nurture. Developmental psychology is where the two forces meet.

The big idea that defines the developmental perspective is this:

> *People change in predictable ways as the influences of heredity and environment unfold over time.*

In other words, humans think and act differently at different times of their lives. Physically, development can be seen in such predictable processes as growth, puberty, and menopause. Psychologically, development includes the acquisition of language, logical thinking, and the assumption of different roles at different times of life. Developmental psychologists, then, might not be surprised by a teen who procrastinates. On the contrary, they may see it as normal behavior at that age, given that teens are still learning how to juggle multiple responsibilities and accurately estimate how long things take to complete—all while simultaneously coping with their changing bodies and social worlds.

In the past, much of the research in developmental psychology has focused on children—in part because they change so rapidly and in rather predictable ways. Developmental psychologists are increasing their scrutiny of teens and adults, however, as we discover how developmental processes continue throughout our lives.

Every parent knows the "terrible twos," a time when emotional outbursts are more frequent. Developmental psychologists explain this as a natural consequence of kids' increasing need for independence at that age, combined with limitations in their brains' ability to process frustration effectively.

This teen is engaging in normal risk-taking behavior for his age. Developmental psychologists note that, in our teen years, the rational part of our brain hasn't yet developed its ability to control impulses, which explains why teens are often risk-takers.

1.5.3: The Sociocultural Perspective Links Us to Others

Who could deny that people exert powerful influences on each other? The **sociocultural perspective** places the idea of social influence center stage. From this viewpoint, social psychologists probe the mysteries of liking, loving, prejudice, aggression, obedience, and conformity. In addition,

Dr. Phil Zimbardo, one of your authors, is a social psychologist who studies the "power of the situation" in controlling our behavior.

many have become interested in how these social processes vary from one *culture* to another.

Culture, a complex blend of human language, beliefs, customs, values, and traditions, exerts profound influences on all of us. We can see culture in action not only as we compare people of one continent to those of another but also by comparing people, for example, in the California–Mexican culture of San Diego and the Scandinavian-based culture of Minnesota. Psychology's earlier blindness to culture was due, in part, to the beginnings of scientific psychology in Europe and North America, where most psychologists lived and worked under similar cultural conditions (Lonner & Malpass, 1994; Segall and others, 1998). Today the perspective has broadened: Fewer than half of the world's half-million psychologists live and work in the United States, and interest in psychology is growing in countries outside of Europe and North America (Pawlik & d'Ydewalle, 1996; Rosenzweig, 1992, 1999). Still, much of our psychological knowledge has a North American/European flavor. Recognizing this bias, **cross-cultural psychologists** have begun the long task of reexamining the "laws" of psychology across cultural and ethnic boundaries (Cole, 2006).

Proponents of the sociocultural view do not, of course, deny the effects of heredity or learning or even of unconscious processes. Rather, they bring to psychology a powerful additional concept: the power of the situation. From this viewpoint, then, *the social and cultural situation in which the person is embedded can sometimes overpower all other factors that influence behavior.* For example, certain cultures place greater emphasis on meeting deadlines, which would in turn influence the behavior (such as procrastination) of an individual in that culture.

WRITING PROMPT

Applying the Sociocultural Perspective

Describe a recent example when a situational or cultural factor interfered with your timely attention to a project.

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

1.5.4: The Whole-Person Perspectives Revives Emphasis on the Whole

As the twentieth century dawned, a new challenge to Wundt and structuralism came from the Viennese physician Sigmund Freud and his disciples, who were developing a method of treating mental disorders based on yet another radical idea:

> *Personality and mental disorders arise mainly from processes in the unconscious mind, outside of our awareness.*

Although Freud was not the first to suggest that we are unaware of some mental processes, neither structuralism nor functionalism had imagined that unconscious processes could dominate the personality and cause mental disorders. Moreover, Freud's *psychoanalytic theory* aimed to explain the *whole person,* not just certain components (such as attention, perception, memory, behavior, or emotion), as other schools of psychology had done. His goal was to explain every aspect of mind and behavior in a single, grand theory.

PSYCHODYNAMIC PSYCHOLOGY Freud could be a difficult mentor, provoking many of his followers to break ranks and develop their own theories. We use the term *psychodynamic* to refer both to Freud's ideas and to all the other neo-Freudian formulations that arose from Freud's notion that the mind (psyche), especially the unconscious mind, is a reservoir of energy (dynamics) for the personality. This energy, says **psychodynamic psychology**, is what motivates us.

The first and best-known representative of the psychodynamic approach is, of course, Sigmund Freud, whose system is called **psychoanalysis**. Originally conceived as a medical technique for treating mental disorders, this system emphasizes the analysis of dreams, slips of the tongue (the so-called Freudian slip), and a technique called free association to gather clues to the unconscious conflicts and "unacceptable" desires thought to be censored by consciousness. For example, psychoanalysts might interpret a person's pattern of

This cartoon illustrates the Freudian slip, which suggests that thoughts or feelings we try to hide from others will sometimes accidentally find their way into our speech. Thus, our unconscious is revealed.

self-defeating behavior—such as procrastination—as motivated by an unconscious fear of failure.

Like Freud, most psychoanalysts today are physicians with a specialty in psychiatry and advanced training in Freudian methods. But these practitioners are not the only ones aspiring to explain the whole person. Two other groups share an interest in a global understanding of the personality, *humanistic psychology* and *trait and temperament psychology*. Here, we group all three under the heading **whole-person perspectives**.

HUMANISTIC PSYCHOLOGY   Reacting to the psychoanalytic emphasis on sinister forces in the unconscious, **humanistic psychology** took a different tack.

> Their radical new idea was *an emphasis on the positive side of our nature that included human ability, growth, and potential.*

Led by the likes of Abraham Maslow and Carl Rogers, they offered a model of human nature that proposed innate needs for growth and goodness, and also emphasized the free will people can exercise to make choices affecting their lives and growth (Kendler, 2005).

In the humanistic view, your self-concept and self-esteem have a huge influence on your thoughts, emotions, and actions, all of which ultimately impact development of your potential. So, from this perspective, procrastination may be driven by low self-esteem—or conversely, by inflated self-esteem if the procrastinator believes he can get the job done more quickly than is realistic. Either way, the behavior would be traced to the person's beliefs about himself. Like psychodynamic psychology, humanistic psychology has had a major impact on the practice of counseling and psychotherapy.

TRAIT AND TEMPERAMENT PSYCHOLOGY   The ancient Greeks, who anticipated so many modern ideas, proclaimed that personality is ruled by four body *humors* (fluids): blood, phlegm, melancholer, and yellow bile. Depending on which humor was dominant, an individual's personality might be sanguine (dominated by blood), slow and deliberate (phlegm), melancholy (melancholer), or angry and aggressive (yellow bile).

We no longer buy into the ancient Greek typology, of course. But their notion of personality traits lives on in modern times as **trait and temperament psychology**. The fundamental idea distinguishing this group says:

> *Differences among people arise from differences in persistent characteristics and internal dispositions called* traits *and* temperaments.

You have probably heard of such traits as introversion and extraversion, which seem to be fundamental characteristics of human nature. Other traits psychologists have identified in people all over the world include a sense of anxiety or well-being, openness to new experiences, agreeableness, and conscientiousness. Some psychologists also propose that we differ on an even more fundamental level called *temperament*,

thought to account for the different dispositions observed among newborn babies (and among adults as well).

Trait and temperament psychologists might explain procrastination in terms of the extent to which a person possesses the trait of conscientiousness. So, for example, a person who is high in conscientiousness—in other words, takes commitments very seriously—would be less likely to procrastinate. The individual who habitually puts things off, yet doesn't get stressed at missed deadlines, would be labeled low on conscientiousness and in possession of an easy temperament (thus explaining the low stress). All these individual characteristics would be presumed to be at least partly biological in nature and would be expected to be fairly consistent over time and across situations.

1.6: Psychology's Perspectives: Six Tools in Your Toolbox

Objective: **Apply psychology's perspectives to a behavior of your own**

Together, then, these six perspectives all play key roles in developing a holistic understanding of human behavior. As we have seen with our example of procrastination, many perspectives can reasonably apply to any single behavior—and rarely is just one perspective sufficient to adequately explain the behavior. (We hasten to add, however, that explanations for a behavior are not intended as justifications for it. Instead, they function well as clues for overcoming a behavior when it is problematic, or for understanding behaviors in others.) In almost all cases, we need multiple perspectives to fully understand the causes of human behavior. Just as a variety of tools in a carpenter's toolbox are necessary to build a house, so does each of these perspectives contribute a unique and essential tool as you construct your understanding of human behavior.

Do It Yourself!
Applying Psychology's Perspectives

By applying the six perspectives to behaviors of interest in your own life, you can become more sophisticated and more accurate in your interpretations of why people do what they do.

- Why do some people commit acts of terror or violence?
- What causes infidelity in romantic relationships?
- What makes a person feel anxious when speaking in public?
- Why do people smoke cigarettes?

Consider one of these questions, or create one of your own. Can you explain how at least four of psychology's

perspectives might explain that behavior? If so, you are well on your way to understanding the importance of multiple perspectives in the field of psychology.

Applying Psychology's Perspectives

Identify a behavior that you've seen, either in yourself or in others, that puzzles you. Use at least two psychological perspectives to explain this behavior.

▶ `The response entered here will appear in the performance dashboard and can be viewed by your instructor.`

Submit

Psychology Matters

The Changing Face of Psychology

Modern psychology is a field in flux. In recent decades, the biological, cognitive, and developmental perspectives have become dominant. And increasingly, adherents of once-conflicting perspectives are making connections and joining forces: We now see such new and strange hybrid psychologists as "cognitive behaviorists" or "evolutionary developmentalists." At the same time, nearly all specialties within psychology seem eager to make a connection with neuroscience, which is rapidly becoming one of the pillars of the field.

Cross-cultural psychologists, such as this researcher in Kenya, furnish important data for checking the validity of psychological knowledge.

We also call your attention to a noteworthy shift in the proportion of psychologists who are women and members of minority groups. Ethnic minorities—especially Asians, African Americans, and Latinos—are becoming psychologists in increasing numbers, making up about 25% of newly minted doctorates in psychology (APA Center for Workforce Studies, 2010). Even more striking is the new majority status of women in psychology. In 1906, only 12 percent of American psychologists were women, according to a listing in American Men of Science

(named with no irony intended). By 1921, the proportion had risen above 20 percent. And now, women receive more than two-thirds of the new doctorates awarded in the field each year (Cynkar, 2007b; Kohout, 2001).

Although psychology has always included a higher proportion of women than any of the other sciences, women have often found gender biases blocking their career paths (Furumoto & Scarborough, 1986). For example, G. Stanley Hall, one of the pioneers of American psychology, notoriously asserted that academic work would ruin a woman's health and cause deterioration of her reproductive organs. Nevertheless, as early as 1905, the American Psychological Association elected its first female president, Mary Whiton Calkins. See Table 1.1 for a sampling of other important contributions made by women to the field of psychology.

Table 1.1 A Sampling of Women's Contributions to Psychology

	Research Area	Institutional Affiliation
Mary Ainsworth	Infant attachment	University of Toronto
Mary Calkins	Memory, psychology of the self	Wellesley College
Christine Ladd Franklin	Logic and color vision	Johns Hopkins University
Carol Gilligan	Gender studies, moral development	Harvard University
Julia Gulliver	Dreams and the subconscious self	Rockford University
Diane Halpern	Critical thinking, gender differences	University of Cincinnati
Elizabeth Loftus	False memory	Stanford University
Eleanor Maccoby	Developmental psychology, effects of divorce on children	University of Michigan
Lillien Martin	Psychophysics	Wellesley College
Christina Maslach	Burnout and job stress	Stanford University
Anna McKeag	Pain	Bardwell School
Sandra Scarr	Intelligence	Harvard University
Margaret Washburn	Perception	Vassar College

Key Question: How Do Psychologists Develop New Knowledge?

Core Concept 1.3

Psychologists, like all other scientists, use the scientific method to test their ideas empirically.

What makes psychology different from "common sense" explanations for human behavior, or other pseudo-psychological approaches to understanding people?

Only psychology has survived trial by the **scientific method**, which is a way of testing ideas against observations. Pseudo-psychology, in contrast, is based on hope, confirmation bias, anecdote—and human gullibility.

You might think this an arrogant view for psychologists to take. Why can't we make room for many different ways of understanding people? In fact, we do. Psychologists welcome sociologists, anthropologists, psychiatrists, and other scientists as partners in the enterprise of understanding people. We reject only those approaches that mislead people by claiming to have "evidence" that is, in truth, only anecdotes and testimonials.

What makes psychology a real science, then, is the *method.* As our core concept says:

> Psychologists, like all other scientists, use the scientific method to test their ideas empirically.

What is this marvelous method? Simply put, the scientific method is a way of putting ideas to an objective pass–fail test. The essential feature of this test is **empirical investigation**, the collection of objective information by means of careful measurements based on direct experience—rather than mere opinion. From empirical investigations, psychological science ultimately seeks to develop comprehensive explanations for behavior and mental processes. In science, we call these explanations theories—a commonly misunderstood word.

"It's only a theory," people may say. But to a scientist, **theory** means something special. In brief, a scientific *theory* is a testable explanation for a broad set of facts or observations (Allen, 1995; Kukla, 1989). Obviously, this definition differs from the way people customarily use the term. In everyday language, theory can mean wild speculation or a mere hunch—an idea that has no evidence to support it. But to a scientist, a good theory has two attractive attributes: (a) the power to explain the facts and (b) the ability to be tested. Examples of well-supported theories include Einstein's theory of relativity, the germ theory of disease, and Darwin's theory of natural selection. But what are the essential steps involved in testing a theory?

By the end of this section, you will be able to:

1.7   **Explain the four basic steps for testing an idea scientifically**

1.8   **Analyze five ways of conducting psychological research**

1.9   **Describe the biases and the ethical issues that exist in psychological research**

1.7: Four Steps in the Scientific Method

Objective: **Explain the four basic steps for testing an idea scientifically**

Testing any idea scientifically requires four basic steps that we can illustrate by applying them to our problem examining the effects of sugar on children's activity (see Figure 1.5). All scientists follow essentially the same steps, no matter whether their field is psychology, biology, chemistry, astronomy, or any other scientific pursuit. Thus, it is the *method* that makes these fields scientific, not their subject matter.

Figure 1.5 Four Steps in the Scientific Method

1. Developing a hypothesis

2. Gathering objective data

3. Analyzing the results

4. Publishing, criticizing, and replicating the results

1.7.1: Develop a Hypothesis

The scientific method first requires a specific testable idea or prediction, called a **hypothesis**. The term literally means "little theory" because it often represents only one piece of a larger theoretical explanation. For example, a hypothesis predicting that introverted people are attracted to extraverted people might be part of a theory tying together all the components of romantic attraction. Alternatively, a hypothesis can just be an interesting idea that piques our curiosity—as in our study of the effects of sugar on children.

To be testable, a hypothesis must be potentially *falsifiable*—that is, stated in such a way that it can be shown to be either correct or incorrect. Let's illustrate how this works with the following hypothesis: *Sugar causes children to become hyperactive.* We could test it by having children consume sugar and then observing their activity level. If we find no increase, the hypothesis is falsified. The hypothesis would *not* be falsifiable if we merely stated a value judgment—for example, that sugar is "bad" for children. Science does not aim to make value judgments and cannot answer questions that can't be tested empirically. See Table 1.2 for examples of other questions science cannot answer.

Table 1.2 What Questions Can the Scientific Method *Not* Answer?

The scientific method is not appropriate for answering questions that cannot be put to an objective, empirical test. Here are some examples of such issues:

Topic	Question
Ethics	Should scientists do research with animals?
Values	Which culture has the best attitude toward work and leisure?
Morality	Is abortion morally right or wrong?
Preferences	Is rap music better than blues?
Aesthetics	Was Picasso more creative than Van Gogh?
Existential issues	What is the meaning of life?
Religion	Does God exist?
Law	What should be the speed limit on interstate highways?

Although science can help us understand such issues, the answers ultimately must be settled by logic, faith, legislation, consensus, or other means that lie beyond the scope of the scientific method.

Next, the scientist must consider precisely how the hypothesis will be tested. This means defining all aspects of the study in concrete terms called **operational definitions**. The following examples could serve as operational definitions for our study.

- *Operational definition of "children."* We can't test all the children in the world, of course. So, our operational definition of "children" might be all the third graders in one class at a nearby elementary school.

- *Operational definition of "sugar."* Likewise, we could define what we mean by "sugar" as the amount of sugar in a commercial soft drink. If we decide, for example, to use 7Up as our sugar source, we could operationally define "sugar" as the 38 grams available in one can of 7Up. (Using a noncaffeinated beverage, such as 7Up, avoids the possibly confounding effects of caffeine on the children's behavior.)

- *Operational definition of hyperactive.* This will be a bit more complicated. Suppose we have specially trained observers who will rate each child's behavior on the following 5-point scale:

passive		moderately active		very active
1	2	3	4	5

So, if our study specifies giving some children a sugar-sweetened drink and others the same drink containing artificial sweetener, we can operationally define "hyperactive" as a significantly higher average activity rating for the group getting the sugared drink.

With our **hypothesis** and **operational definitions** in hand, we have taken the first step in our scientific study. Next, we test our hypothesis. (The great failing of pseudosciences like astrology or fortunetelling is they never actually take this step of testing their assertions.)

WRITING PROMPT

Developing a Hypothesis

Consider a psychological question you'd like answered.

Write a hypothesis that is falsifiable. List the operational definitions for each variable (i.e., the elements of your hypothesis).

▶ | The response entered here will appear in the performance dashboard and can be viewed by your instructor. |

Submit

1.7.2: Collect Objective Data

This is where we begin our empirical investigation. Literally, *empirical* means "experience based"—as contrasted with speculation based solely on hope, authority, faith, or "common sense." This literal definition can be misleading, however, if we mistakenly classify one person's experience as "empirical." Regardless of how powerful one person's experience might be, it remains merely a testimonial or an anecdote that needs to be verified under the controlled conditions of scientific research. As we discussed in the Critical Thinking section earlier in this chapter, it would be risky to assume that one person's experiences would be true for others.

Investigating a question *empirically* means collecting evidence carefully and systematically, using one of several tried-and-true methods we will examine in depth in the next section. Such methods are designed to avoid false conclusions caused by our expectations, biases, and prejudices. The advantage of empirical investigation is that the **data** we obtain can be applied, or generalized, to

a larger group of people with more confidence. Here are a few examples of how psychological studies collect data:

WATCH Ways That Psychologists Study Behavior

This short video clip offers a brief overview of some of the most common ways psychologists use scientific methods to collect data and test psychological theories.

1.7.3: Analyze the Results and Accept or Reject the Hypothesis

Once we have collected our data, we then analyze it using some type of mathematical or statistical formula. If you hate math, though, fear not: Detailed explanations of statistical procedures are beyond the scope of this book—in fact, advanced psychology students take entire courses on statistical methods! In our experiment, however, the statistical analysis will be relatively straightforward, because we merely want to know whether scores for the children receiving sugar are higher than those taking the sugar-free drink. If so, we can declare that our hypothesis has been supported. If not, we will reject it. Either way, we have learned something.

1.7.4: Publish, Criticize, and Replicate the Results

The final step in the scientific method exposes a completed study to the scrutiny and criticism of the scientific community by publishing it in a professional journal, making a presentation at a professional meeting, or—occasionally—writing a book. Then the researchers wait for the critics to respond.

If colleagues find the study interesting and important—and especially if it challenges other research or a widely held theory—critics may look for flaws in the research design: Did the experimenters choose the participants properly? Were the statistical analyses done correctly? Could other factors account for the results? Alternatively, they may decide to check the study by replicating it. To **replicate** the experiment, they would redo it themselves to see if they get the same results.

In fact, our study of the effects of sugar on children is a simplified replication of research done previously by Mark Wolraich and his colleagues (1995). Their study lasted 3 weeks and compared one group of children who ate a high-sugar diet with another group given a low-sugar diet with artificial sweeteners. Contrary to folk wisdom, the researchers found *no differences* between the groups in behavior or cognitive (mental) function. So, if our study were to find a "sugar high" effect, it would contradict the Wolraich findings, and you can be sure it would receive careful scrutiny and criticism.

Criticism also occurs behind the scientific scenes to filter out poorly conceived or executed research prior to publication. Journal editors and book publishers (including the publishers of this text) routinely seek opinions of expert reviewers. As a result, authors usually receive helpful, if sometimes painful, suggestions for revision. Only when a hypothesis has cleared all these hurdles will editors put it in print and scholars tentatively accept it as scientific "truth."

We should emphasize, however, that scientific findings are always tentative. As long as they stand, they stand in jeopardy from a new study that requires a new interpretation or sends earlier work to the academic scrap heap. Consequently, the results of the Wolraich sugar study could be eventually replaced by better, more definitive knowledge (although as of this writing it stands unopposed). Obviously, then, the **scientific method** is an imperfect system, but it is the best method ever developed for testing ideas about the natural world. As such, it represents one of humankind's greatest intellectual achievements.

1.8: Five Types of Psychological Research

Objective: Analyze five ways of conducting psychological research

The scientific method, then, provides much greater credibility for ideas than does mere anecdote or pseudoscience. Within this method, there are several specific ways a researcher can collect objective data. Each has unique advantages, as well as limitations. One key step in conducting good research is choosing the method best suited to your particular hypothesis and resources.

1.8.1: Experiments

Like the word *theory*, the term **experiment** also has a very specific meaning in science. Contrary to everyday use of the term to refer to any type of formal or informal test, the scientific use of the word applies to a particular set of procedures for collecting information under highly controlled conditions. As a result of its careful design, an experiment is the only type of research method we will discuss here that can reliably determine a cause–effect relationship. Thus, if a hypothesis is worded in a manner that suggests cause and effect—as ours does in stating that sugar causes hyperactivity in children—then the experiment is the best option. Let's see how our sugar study can determine cause and effect.

In the most basic experimental design, the researcher varies only one factor, known as a variable, and keeps all other conditions of the experiment under constant control—the same for all participants.

Scientists call that one variable the **independent variable** because it operates independently of everything else in the study. In our sugar study, we hypothesized that sugar causes hyperactivity, so sugar/no sugar is our independent variable. By giving some children sugar and others a sugar substitute, and keeping all other conditions constant, we are manipulating the independent variable. Because all other aspects of the experiment are held constant, we can say that the independent variable is the cause of any experimental effects we observe.

Likewise, the **dependent variable** is the outcome variable, or what we hypothesize to be the effect. In other words, any experimental effects we observe *depend* on the *in*dependent variable that we have introduced. In our sugar experiment, the dependent variable is the children's activity level. If the group receiving the sugar is later observed to be more active, we can be sure it was the sugar that caused the hyperactivity, because it was the only difference between the two groups.

Before going any further, we should clarify two other important terms used to identify our participants.

- Those receiving the treatment of interest (in our study, the high-sugar drink) are said to be in the experimental condition. Individuals exposed to the experimental condition, then, make up the **experimental group**.
- Meanwhile, those in the **control group** enter the control condition, where they do *not* receive the special treatment. (In our study, the control group will get the artificially sweetened drink.) Thus, the control group serves as a standard against which to compare those in the experimental group.

RANDOM ASSIGNMENT EQUALIZES GROUPS   The easy way to divide participants up would be to let the children (or their parents) decide, based on their own preferences. The problem with that, however, is there could be some difference between children whose parents let them drink sugared drinks and those whose parents do not. Perhaps, for example, parents who allow their children to drink sugared drinks are more relaxed about rules in general, which could result in those same kids being rowdier in their play—which would confound our results. Similarly, it wouldn't do to put all the girls in one group and all the boys in the other. Why not? There could be gender differences in their physical reactions to sugar. In addition, one sex might be better than the other at controlling their reactions. These preexisting differences could impact our outcome.

The best solution is to use **random assignment**, by which participants are assigned to each group purely by chance. One way to do this would be to list the children

alphabetically and then assign alternating names to the experimental and control groups. In this way, random assignment minimizes any preexisting differences between the two groups. This, in turn, ensures that any differences in activity level are truly due to sugar rather than to some other factor such as sex or parenting style.

EXPERIMENTS IDENTIFY CAUSE–EFFECT RELATIONSHIPS   In summary, the experimental method is the gold standard for finding cause-and-effect relationships. It does so by isolating the variable of interest (the independent variable) and holding all other conditions of the experiment constant. Random assignment to experimental and control groups is used to minimize preexisting differences between the groups so we can be more confident that differences in the outcome (the dependent variable) are due to the effects of the independent variable and nothing else. For another example of how the experimental method can test a hypothesis—in this case, how it would test the effects of sleep deprivation on test performance—check out this short video.

Given the power of the experiment to find cause and effect, why do we need other methods? For one thing, not all hypotheses aim to find cause and effect—some merely wish to describe certain populations, such as determining what personality traits are common among psychology

WATCH Using the Experimental Method to Test the Effects of Sleep on Test Performance
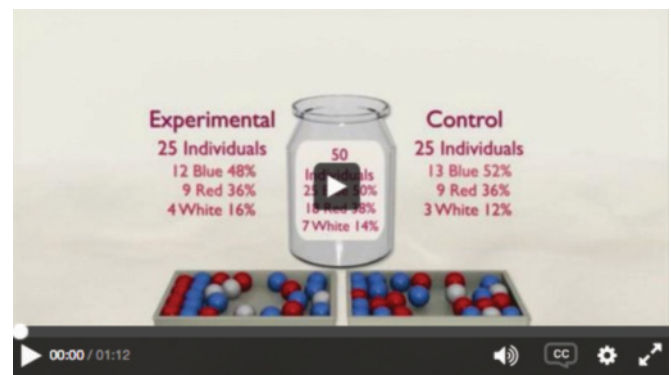
This video provides an excellent and clear example of how the experimental method would be applied in a laboratory to test the effects of sleep deprivation on test performance.

students. For another, ethical considerations prevent us from conducting certain kinds of experimental studies, notably those which might potentially harm participants. In such instances, then, one of the following research methods is a better or more practical choice.

1.8.2: Correlational Studies

In addition to the considerations just described, there is yet another factor that influences a researcher's choice of method: Due to practical or ethical considerations, sometimes scientists cannot gain enough control over the situation to allow

them to conduct a true experiment. Suppose, for example, you wanted to test the hypothesis that children who ingest lead-based paint run an increased risk of learning disabilities. (Lead-based paint is common in older homes, especially in low-income urban housing.) You couldn't do an experiment, because an experiment would require you to manipulate the independent variable—which in this case would mean giving toxic material (lead) to a group of children. Obviously, this would be harmful and unethical.

Fortunately, you can find a way around the problem—but at the expense of some control over the research conditions. The solution takes the form of a **correlational study**. In correlational research you, in effect, look for a "natural experiment" that has already occurred by chance in the real world. So, in a correlational study on the effects of ingesting lead-based paint, you might look for a group of children who had already been exposed to lead paint. Then you would compare them to another group who had not been exposed. As a further control, you should try to match the groups so they are comparable in every conceivable respect (such as age, family income, and gender)—except in their exposure to lead-based paint.

The big drawback of a correlational study is that you can never be sure the groups are completely comparable, because you did not randomly assign people to **experimental groups** or manipulate the **independent variable**. In fact, the groups may differ on some important variables (such as access to health care or nutrition) that you could have overlooked. Thus, even if you observe more learning disabilities among children who were exposed to lead-based paint, you cannot conclude with certainty that exposure to the paint *caused* the disabilities. The most you can say is that lead-based paint is *correlated* (associated) with learning disabilities. This is, however, still useful, as it narrows the search for links to learning disabilities. In addition, a series of solid correlational findings sometimes pave the road to an experimental study. Many research findings reported in the media are likely to be from correlational studies, rather than experimental ones, so let's take a closer look at what these findings mean and how we can accurately interpret them.

THREE TYPES OF CORRELATIONS (SEE FIGURE 1.6)

1. If two variables show a pattern in which they vary in the same direction (as one variable increases, so does the other), we say they have a *positive correlation*. For example, we predicted a positive correlation in our hypothesis that children exposed to lead-based paint are at higher risk for learning disabilities.

2. But when one variable decreases as the other increases, this is called a *negative correlation*. You would probably find a negative correlation between the amount of alcohol consumed by college students and their grade-point averages (as college students increase their consumption of alcohol, their grade-point averages decrease).

3. Finally, if the variables have no relationship at all, there is a *zero correlation*, which is what you might expect between height and GPA, for example.

Researchers usually express the degree of correlation as a number that can range from as low as −1.0 (reflecting a strong negative correlation) to a positive number as high as +1.0 (indicating a strong positive correlation). It is important to note that *a correlation can show a strong relationship even when it is negative.* (Note: Professors often ask test questions about this!) Suppose we find a correlation of −0.7 between anxiety and time spent studying. In other words, this is a negative correlation indicating more anxiety is correlated with less studying. Even though this is a negative correlation, it shows a *stronger* relationship than the positive correlation of +0.4 that is found, for example, between SAT scores and grades.

Figure 1.6 Three Types of Correlation

The graphs illustrate the three main types of correlation, with data points for 27 individuals. **(A)** shows a *positive correlation* between SAT scores and GPA; **(B)** shows a *negative correlation* between alcohol consumption and GPA; and **(C)** shows *no correlation* between height and GPA.
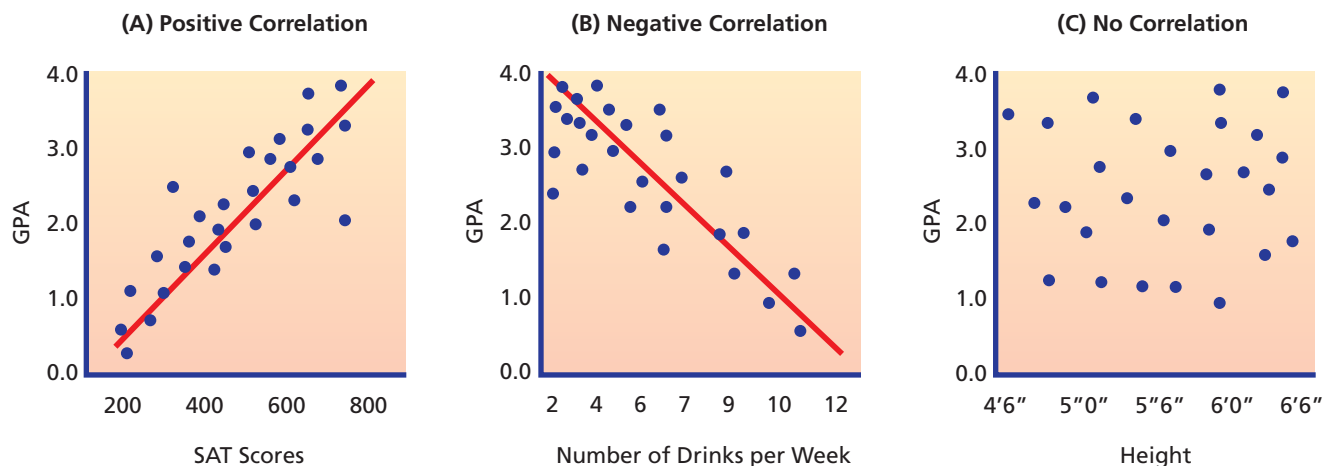
Think about two variables that you think are related in your own life. Describe how you see them related, and state whether the correlation you predict is a positive correlation or a negative correlation.

INTERPRETING CORRELATIONAL FINDINGS   One of the most common errors in critical thinking occurs when correlational findings are misinterpreted as cause-and-effect findings. For example, some years ago, research identified a positive correlation between children's self-esteem and their performance in school. Did that mean high self-esteem caused kids to do better in school? Not necessarily—and to conclude otherwise is a critical thinking error! While that notion certainly fits our "common sense" ideas about the benefits of self-esteem, without conducting an experiment, manipulating the independent variable (self-esteem), and randomly assigning students to experimental and control conditions, we cannot be sure what the causal factor is. Scientists often put the general principle this way: *Correlation does not necessarily mean causation.*

So, to avoid this important critical thinking error, you must consider three possible interpretations for any correlational finding (see Figure 1.7):

- *A causes B*. If "A" refers to the first variable mentioned—in this case, self-esteem—and "B" refers to the second variable (grades), this interpretation recognizes that self-esteem may indeed influence a student's grades in school. That is, however, only one possibility.

- *B causes A*. It could also be the case that grades in school influence self-esteem—in other words, that our initial assumption about causality was backwards. If you think about it, couldn't it also be possible that students who do well in school feel better about themselves as a result? If that were true, grades in school (rather than self-esteem) would be the driving force of the correlation.

- *C causes both A and B*. Yet a third possibility must also be recognized in contemplating correlational findings: What if a *different* variable (C)—something not measured in the study—was actually the driving force behind the observed relationship? In this example, what might influence a student's school performance *and* his or her self-esteem? Perhaps more time spent with parents helps a child succeed in school and also improves the child's self-esteem. In that case, we would be mistaken to assume that grades and self-esteem were related causally—instead, they just appeared that way due to lack of attention to the true source of both.

The important thing to remember is that without a true experiment, speculation about cause is just that: speculation—and potentially dangerous speculation at that. This danger was powerfully illustrated by the very findings we have discussed here: In the wake of correlational studies showing a relationship between self-esteem and grades, mil-lions of dollars were spent nationwide on programs training teachers to improve students' self-esteem, with the mistaken assumption that higher self-esteem would in turn raise students' grades. Did it work? No. On the contrary, follow-up experimental research discovered that getting good grades is one causal component in high self-esteem, providing support for the B causes A explanation given previously. Moreover, it turns out that self-control (in this case, an example of a C variable) promotes both self-esteem and school performance (Baumeister and others, 2003). Even trained researchers and lawmakers can make mistakes when "common sense" biases their accurate interpretations of research.

Figure 1.7   Three Ways to Interpret Correlational Findings

1. Variable A (Self-Esteem) and Variable B (Grades in School) are positively correlated (related). Students with higher self-esteem also have higher grades

2. One possible interpretation of this correlation is that A causes B—in this case, that having higher self-esteem helps a person do better in school.

3. A second possible interpretation of this correlation is that B causes A—in this case, that getting higher grades in school boosts a person's self-esteem.

4. A third possible interpretation recognizes that a third variable (which we would call the C variable)—unmeasured in the study—might account for the relationship between A and B. In this case, one possible C variable could be self-control. In other words, perhaps self-control helps a student do well in school, and self-control also leads to higher self-esteem.

Hence, all three interpretations must be considered in a correlational study, because without an experimental study, cause and effect cannot be determined.
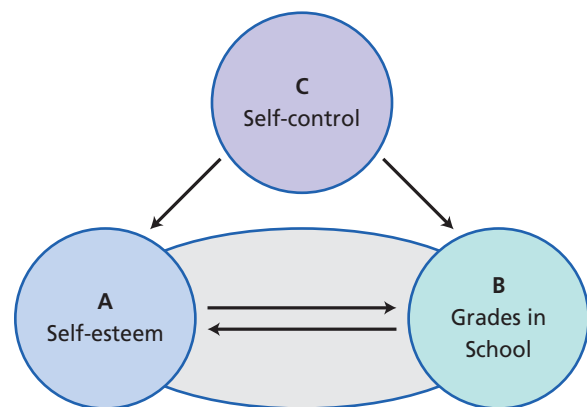
WRITING PROMPT

Interpreting Correlations

Consider the following scenario: A news article report states that people who sleep more are more creative.

Using the three ways to interpret correlational findings, write out (using A, B, C format) all the ways to interpret this finding.

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

1.8.3: Surveys

Which type of learning do students prefer: listening to lectures, reading material on their own, or participating in hands-on activities? If you want to know the answer to this question, you don't need to perform an experiment or a correlational study. Instead, you can simply ask students what they like using a **survey**, which is a popular and effective method of determining people's attitudes, preferences, or other characteristics.

Widely used by political pollsters and marketing consultants (as well as by many researchers in psychology and sociology), surveys typically ask people for their responses to a prepared set of questions. The biggest advantage of the survey method is its ability to gather data from large numbers of respondents relatively quickly and inexpensively, such as through Internet surveys. This easy access to many people is also the source of the survey's biggest disadvantage: its vulnerability to a variety of biases.

What are some common biases in conducting or interpreting results of a survey? Social desirability bias refers to respondents' tendency to answer questions in ways that are socially or politically correct (Schwarz, 1999). Other biases (see Table 1.3) can stem from:

- Wording of the questions (Are they clear? Do they use emotionally charged words to elicit a particular type of response?)

- The sample (How well do the respondents represent the general population?)

- The survey conditions (Is the survey anonymous? Are people completing it in a setting that might bias their responses?)

If care is taken to avoid these biases, surveys can be very useful—but only when the hypothesis can be legitimately studied with a survey. Examining the effects of sugar on children's activity level by asking parents if they've noticed their children behaving more actively after consuming sugar, for example, would reveal parents' opinions about sugar and hyperactivity—but opinions do not empirically test the relationship in which we are interested. Thus, it would not be an appropriate choice for solving our chapter problem.

1.8.4: Naturalistic Observations

In her classic studies showing that chimpanzees have a complex, tool-making culture, Jane Goodall observed chimps in their natural jungle environment. Likewise, when psychological researchers want to know how people act in their natural surroundings (as contrasted with the artificial conditions of a laboratory), they use the same method of **naturalistic observation**. This approach is a good choice for studying child-rearing practices, shopping habits, or how people flirt in public. Thus, the setting for a naturalistic observation could be as varied as a home, a shopping mall, a restaurant, or a remote wilderness.

Jane Goodall used the method of naturalistic observation in her pioneering studies of chimpanzee behavior in the wild.

As you might guess, naturalistic observations are made under far less controlled conditions than are experiments because the researcher merely observes and records behaviors, rather than manipulating the environment. The best naturalistic observations, however, follow a carefully thought-out plan. Thus, such concerns as expectancy bias can be minimized by use of systematic procedures for observation and data collection and by careful training of observers.

Table 1.3 Common Types of Survey Bias and How to Correct for Them

Type of Bias	Example of Bias	Correcting for the Bias
Social Desirability Bias	Asking drivers if they have ever broken a traffic law.	Ask how often they break traffic laws, and give options of "Rarely," "Sometimes," and "Frequently."
Avoid Leading Questions	Do you agree that it is important to save the environment?	On a scale of 1 to 10, how concerned are you about the environment?
Double-Barreled Questions	How happy are you with your phone company's rates and customer service?	How satisfied or dissatisfied are you with your phone company's rates? How satisfied or dissatisfied are you with your phone company's customer service?
Representative Sampling	Asking people at a gym how important their health is to them.	Collect data in several locations, none of which are related to health.
Survey Conditions	Asking a couple to fill out a questionnaire about their relationship satisfaction.	Give each partner in the couple a separate questionnaire, and ensure that they complete it in separate rooms without conversing with each other.

The advantage of naturalistic observation is that you see the behaviors as they naturally occur, which often reveals insights not found in a laboratory setting. In some situations, it is also more cost effective to use the natural environment rather than try to reconstruct one in the lab. The disadvantages include the lack of control over the environment, which prohibits causal conclusions, as well as the time-consuming and expensive nature of a well-designed naturalistic study.

1.8.5: Case Studies

How might you study what shaped comedian Stephen Colbert's sense of humor? You can't conduct any type of **empirical research**, because (for better or worse) you have only one Stephen Colbert. In situations such as this, researchers must rely on the **case study**, a unique type of research method that focuses in depth on only one or a few individuals, usually with rare problems or unusual talents. For example, in his book Creating Minds, Howard Gardner (1993) used the case study method to explore the thought processes of several highly creative individuals, including Einstein, Picasso, and Freud. Therapists who use case studies to develop theories about mental disorder sometimes call this the *clinical method.* By either name, the disadvantages of this approach lie in its subjectivity, its small sample size, and the lack of control over variables that could affect the individuals under study. These limitations severely restrict the researcher's ability to draw conclusions that can be generalized or applied with confidence to other individuals. Nevertheless, the case study can sometimes give us valuable information that could be obtained in no other way.

1.9: Biases and Ethical Issues in Psychological Research

Objective: Describe the biases and the ethical issues that exist in psychological research

1.9.1: Controlling Biases

Assisted suicide. Abortion. Capital punishment. Do you have strong feelings and opinions on any of these issues?

Emotion-laden topics can bring out biases that make critical thinking difficult, as we have seen. The possibility of bias poses problems for psychologists interested in studying such issues as child abuse, gender differences, or the effects of racial prejudice—topics that may interest them precisely because of their own strong opinions. Left uncontrolled, researchers' biases can affect the ways they

design a study, collect the data, and interpret the results. Let's take a look at two forms of bias that require special vigilance in research.

1. **Emotional bias** involves an individual's cherished beliefs, strong preferences, unquestioned assumptions, or personal prejudices. Often these are not obvious to the individual holding the bias (and it is also important to recognize that we all have emotional biases—they are simply a function of our humanity). For example, in his book *Even the Rat Was White*, psychologist Robert Guthrie (1998) points out the bias in the long psychological tradition of research on college students—who were most often White—without realizing they were introducing bias with their sample-selection procedures. This practice limited the applicability of the research results to people of color. Fortunately, the scientific method, with its openness to peer criticism and replication, provides a powerful counterbalance to an experimenter's emotional bias. Still, scientists would prefer to identify and control their biases before potentially erroneous conclusions hit print.
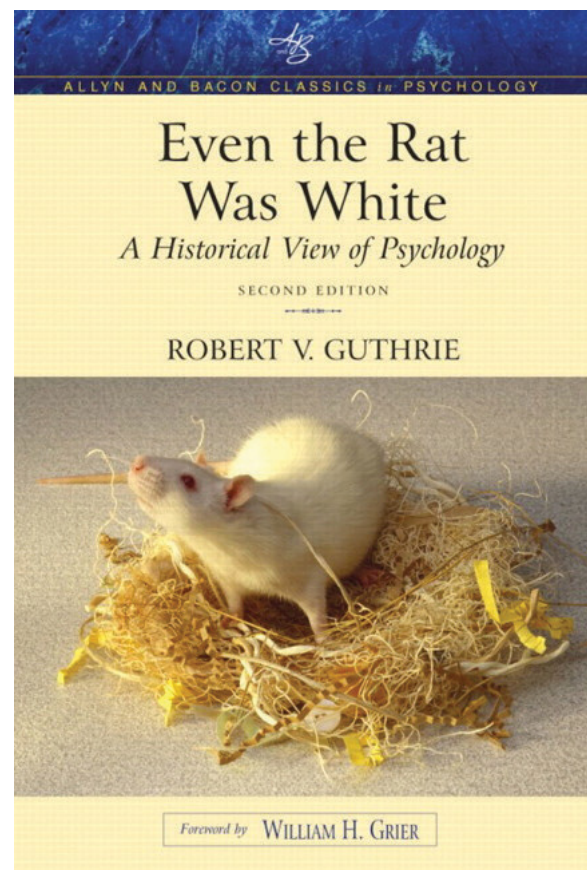
In many historical studies of psychology, all or most participants were White. Without realizing it, researchers biased their results by omitting people of color. As a result, findings were still valid, but could be applied only to Caucasians, and not assumed to apply to persons of color.

2. **Expectancy bias** can also affect scientists' conclusions when they observe only what they *expect* to observe. (You can see a close kinship here with **confirmation bias**.) Expectancy bias revealed itself in, for example, a notable study in which psychology students trained rats to perform behaviors such as pressing a lever to obtain food (Rosenthal & Lawson, 1964). The experimenters told some students their rats were especially bright; other students heard their rats were slow learners. (In fact, the experimenters had randomly selected both groups of rats from the same litters.) Sure enough, the students' data showed that rats believed to be bright outperformed their supposedly duller littermates—in accord with the students' expectations. How could this be? Apparently, rats perform better for an enthusiastic audience! Follow-up questionnaires showed that students with the "bright" rats were "more enthusiastic, encouraging, pleasant, and interested in their rat's performance."

Not only can these sources of bias lead to erroneous conclusions, they can also produce expensive or even dangerous consequences. Imagine that you are a psychologist working for a pharmaceutical company that wants you to test a new drug. With millions of dollars riding on the outcome, you may not be thinking with complete objectivity—despite your most sincere efforts. And what about the doctors who will prescribe the drug to patients in your study? Surely they will have high hopes for the drug, as will their patients. And so the stage is set for expectancy bias to creep covertly into the study.

Fortunately, scientists have developed a strategy for controlling expectancy bias by keeping participants in the research experimentally "blind," or uninformed, about whether they are getting the real treatment or a **placebo** (a sham "drug" or fake treatment with no medical value).

Even better is the **double-blind study**, which keeps *both* participants and experimenters unaware of which group is receiving which treatment. In a double-blind drug study, then, neither researchers nor participants would know (until the end of the study) who was getting the new drug and who was getting the placebo. This scientific trick controls for experimenters' expectations by ensuring that experimenters will not inadvertently treat the experimental group differently from the control group. And it controls for expectations of those receiving the experimental treatment, because they are also "blind" to which group they have been assigned.

As you can imagine, expectancy bias could affect the response of the children in our sugar study. Similarly, expectations of the observers could color their judgments. To prevent this, we should ensure that neither the children nor the observers nor the teachers know which children received each condition.

1.9.2: Ethical Issues in Psychological Research

Research also can involve serious ethical issues, such as the possibility of people being hurt or unduly distressed. No researcher would want this to happen, yet the issues are not always clear. Is it ethical, for example, in an experiment on aggression, to deliberately provoke people by insulting them? What degree of stress is too high a price to pay for the knowledge gained from the experiment? Such ethical issues raise difficult but important questions, and not all psychologists would answer them in exactly the same way.

To provide some guidelines for researchers, the American Psychological Association (APA) publishes *Ethical Principles of Psychologists and Code of Conduct* (2010a). This document not only deals with the ethical obligation to shield research participants from potentially harmful procedures, but also warns researchers that information acquired about people during a study must be held confidential (Knapp & VandeCreek, 2003; Smith, 2003a, 2003b).

INFORMED CONSENT One important ethical guideline involves gaining **informed consent**, which ensures that participants are willingly engaging in the research. In our sugar study, for example, we might explain to parents and the teacher the broad outline of the experiment like this:

> We propose to examine the supposed effect of sugar on children's activity level. To do so, we have planned a simple study of the children in your child's third-grade classroom—subject to the permission of their parents. The procedure calls for dividing the children into two groups: At lunchtime, one group will be given a commercial soft drink (7Up) sweetened with sugar, while the other group will be given the same drink sweetened with artificial sweetener (Diet 7Up). The children will not be told to which groups they have been assigned. For the rest of the school day, specially trained observers will rate the children's activity level. Once averaged, ratings will show whether the group receiving the sugar-sweetened drink was more active than the other group. We will share the results with you at the end of the study.

DECEPTION The use of deception poses an especially knotty problem for researchers in psychology. As discussed earlier, the *Ethical Principles* document states that, under most circumstances, participation in research should be voluntary and informed, so volunteers are told what challenges they will face and have a real opportunity to opt out of the study. But the issue can be more complicated than it first appears. What if you are interested in the "good Samaritan" problem: the conditions under which people will help a stranger in distress? If you tell people you have contrived a phony emergency situation and ask them whether they are willing to help, you will spoil the very

effect you are trying to study. Consequently, the guidelines do allow for deception under some conditions, provided no substantial risks are likely to accrue to the participants.

You might well ask, "Who judges the risks?" Most places where research is done now have watchdog committees, called *institutional review boards* (IRBs), that examine all studies proposed to be carried out within an institution, such as a college, university, or clinic. Further, when a researcher uses deception, the APA guidelines require a **debriefing** session as soon as possible after the research to be sure they suffer no lasting ill effects. At that time, participants are informed of the deception, along with the rationale for it in the study and their contribution to the study's findings, so they may ask any questions they have and gain understanding of the process. Despite these precautions, some psychologists stand opposed to the use of deception in any form of psychological research (Baumrind, 1985; Ortmann & Hertwig, 1997).

These, then, are a few of the procedures psychologists are required to follow to ensure their research is ethical, and that it does not cause harm to any of their participants. Think you've got it? Test your understanding of these issues in this Do It Yourself! feature to see if you can spot potential ethical violations in action.

Do It Yourself!
Is This Research Ethical?

Dr. Levy is an educational psychologist curious about what factors influence college students' success in their classes. While sitting in his office one afternoon, he begins to wonder about the extent to which classroom distractions might influence students' test performance. He quickly sketches out an idea for an experiment to examine the effects of distraction on test performance. His timing is perfect, he thinks, because two of his sections of introductory psychology have their first examination of the semester tomorrow!

The next day, Dr. Levy goes to his first class and passes out the test. Unbeknownst to this section of this course, Dr. Levy has planned distractions to occur at 15 minute intervals throughout the class period in the following order:

In the hallway outside the classroom, a couple pretends to have a fight—they yell and scream at each other for 2 minutes.

On the lawn immediately outside the classroom, a grounds technician mows the grass. The window is open so the sound of the mower is particularly loud.

Finally, near the end of the period, Dr. Levy "accidentally" turns on a PowerPoint program complete with audio. Dr. Levy "pretends" that he can't figure out how to turn the program off.

In the other section of his course, Dr. Levy gives his test under normal conditions—the classroom is quiet with no interruptions or distractions.

When Dr. Levy analyzes his data from his research, he discovers that the distractions indeed influenced student performance on the test—on average, the class that underwent the three distractions scored a full letter grade poorer than the class that did not experience any distractions. Although Dr. Levy plans to write up his study for publication, he did not share any information about his study with students in either of his classes.

WRITING PROMPT

Applying Ethical Guidelines

Although Dr. Levy is delighted with his results, you suspect he violated some ethical guidelines for conducting psychological research. List which guidelines he violated. Use examples to support your answer.

▶ | The response entered here will appear in the performance dashboard and can be viewed by your instructor.

  Submit

SOCIAL MEDIA IN RESEARCH How do you feel about researchers using your Facebook, Twitter, or Reddit posts to gather information about you? Like it or not, it's happening, and as is often the case with new technologies, its use exploded well ahead of thoughtful and informed discussion and decision-making about the benefits and potential drawbacks—and before precautionary measures could be put into place to protect participants from possible harm. This issue made headlines in 2014, when Facebook researchers reported they had successfully manipulated users' emotions by altering the balance of positive-to-negative posts users saw on their News Feed (Kramer and others, 2014). Scientists and Facebook users alike were alarmed, as the experiment had been conducted without users' explicit consent. Authors of the experiment, however, argued that Facebook users agreed to such possibilities when they first joined Facebook and accepted the "Conditions of Use." In the aftermath of that incident, psychologists have hastened to examine how social media websites (SMWs) provide both opportunities and challenges for research (Moreno and others, 2013).

- *How does research involving SMWs fit into the APA's Ethical Guidelines?*

  Clearly, SMWs offer a unique and exciting opportunity to researchers. They provide reams of easily accessible information and the ability to examine the natural behavior and interactions of individuals (thus creating a new form of naturalistic observational research) from the comfort of a researcher's own office.

- *Are there risks to users of SMWs, and does research involving them violate their rights to privacy and confidentiality?*

Informed consent and privacy are two of the most obvious concerns. Federal guidelines mandate that consent must be obtained from human subjects if the researcher gains information by interacting with the individual, or obtains information that is private and identifiable. So, for example, psychologists observing shopping habits in a public mall by measuring how long shoppers spend in each store, and how many stores they visit, do not interact with the shopper or collect any data that can identify the shopper or is private—thus, in this study, there is no requirement to obtain consent. Similarly, if public health researchers follow Twitter feeds to find out how many people are experiencing flulike symptoms in order to better predict and be prepared for flu epidemics (something that has already been done with success), no individual data is gathered and no interaction is required or requested, so there is no need for consent according to current standards (Paul and others, 2014). Just as there is no expectation of privacy in a public mall, there is no expectation of privacy on Twitter. Thus, no ethical boundaries are violated in these nonintrusive, simple observational studies in public forums.

- *But what about studies that go beyond simple observation, such as the controversial Facebook study published in 2014?*

In that instance, researchers interacted with almost 700,000 Facebook users without their knowledge. It was a true experimental design: manipulate one condition

---

Figure 1.8 Using SMWs for Passive Data Collection Without Violating Ethical Boundaries

One finding reported here is that, of all tweets with hashtags, 70% come from mobile devices and 30% come from desktop or laptop computers. Collecting this data does not violate any expectations of privacy, and confidentiality is not an issue because no users are identified—the data is anonymous.
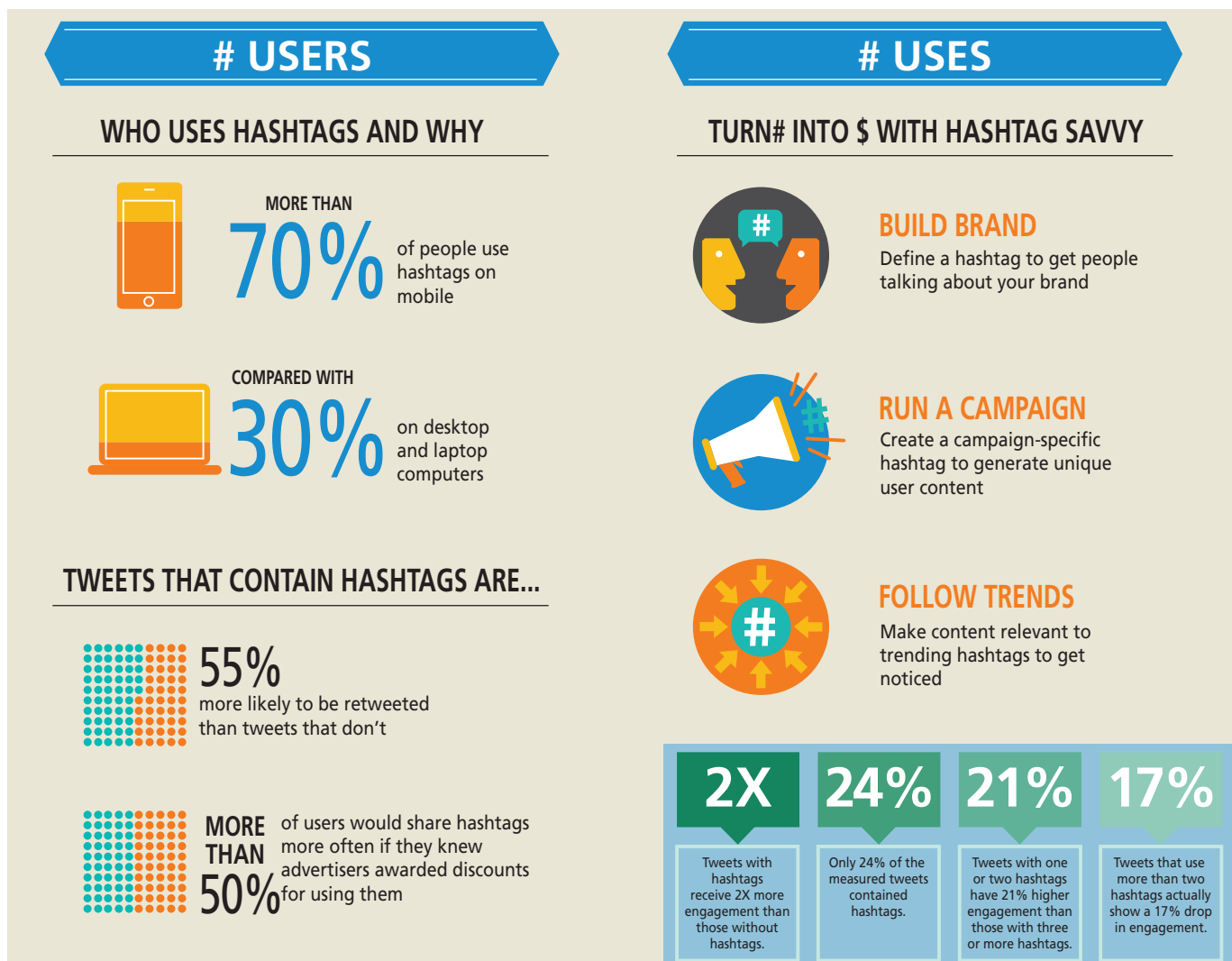
(in this case, the positive-negative emotional tone of News Feeds) while holding other conditions constant, so that if users' own posts became more negative or positive after the manipulation, researchers could be sure the change was due to the manipulation. But we've already learned that participants in an experiment must give their informed consent to the procedure—and in this case, they did not. They didn't even know about it.

Institutional review boards—the "watchdog committees" at universities and other bona-fide research organizations—are now tackling this problem by adding new guidelines to deal with research using SMWs, to ensure that ethical boundaries are not crossed in the future.

Your Views on Social Media Websites for Research

List the pros and cons to this issue. Pick a side and explain your position.

▶ **The response entered here will appear in the performance dashboard and can be viewed by your instructor.**

`Submit`

Where do you stand on this complicated issue? Do you agree with the Facebook researchers, who assert that agreeing to the conditions of use when joining a forum such as Facebook constitutes informed consent to being included in research? Or, should users be offered a chance to opt out of any planned research, and if so, would that risk biasing the research findings? In weighing the benefits of research findings against possible risk of harm to participants, where do you draw the line?

ANIMAL STUDIES   Another long-standing ethical issue surrounds the use of laboratory animals, such as rats, pigeons, and monkeys. Animals make desirable research subjects because of the relative simplicity of their nervous systems and the ease with which large numbers of individuals can be maintained under controlled conditions. Animals also have served as alternatives to humans when a procedure was deemed risky or outright harmful, such as implanting electrodes in the brain to study its parts.

With such concerns in mind nearly 100 years ago, officers of the American Psychological Association established a Committee on Precautions in Animal Experimentation, which wrote guidelines for animal research (Dewsbury, 1990). More recently, the APA's *Ethical Principles* document reiterated the experimenter's obligation to provide decent living conditions for research animals and to weigh any discomfort caused them against the value of the information sought in the research. Additional safeguards appear in a 1985 federal law that regulates animal research (Novak & Suomi, 1988).

Recent years have seen a renewal of concern about the use of animals as research subjects. When the research involves painful or damaging procedures, such as brain surgery, electrode implants, or pain studies, people become especially uneasy. Some feel that limitations should be more stringent, especially on studies using chimpanzees or other humanlike animals. Others believe that limitations or outright bans should apply to all animal research, including studies of simple animals such as sea slugs (often used in neurological studies). While many psychologists support animal research under the APA guidelines, the issue remains a contested one (Bird, 2005; Plous, 1996).

Psychology Matters

The Perils of Pseudo-Psychology

Now that we understand the importance of the scientific method in determining the credibility of claims we hear in the news, let's look at a few serious problems that have resulted from failures to follow this reliable system carefully.

In 1949, the Nobel Prize in medicine went to the inventor of the "lobotomy," which at the time was a crude brain operation that disconnected the frontal lobes from the rest of the brain. Originally intended as a treatment for severe mental disorders, the operation led instead to thousands of permanently brain-injured patients. The procedure had no careful scientific basis, yet it became popular because people who *wanted* it to work didn't ask critical questions. **Emotional bias** (in this case, the desire to cure people with severe mental illnesses) promoted blind faith instead of clear-eyed scrutiny. As a result, people failed to examine the evidence objectively.

For a modern example of pseudo-psychology's harmful effects, we offer the widespread belief that positive thoughts can cure dire diseases such as cancer. What could possibly be wrong with that idea? For one thing, the evidence doesn't support the notion that a person's state of mind significantly impacts the chances of recovery from a serious physical illness (Cassileth and others, 1985; Coyne and others, 2007). For another, the attitude-can-make-you-well belief can lead to "blaming the victim," or assuming that a patient didn't get well because his or her attitude was not sufficiently optimistic (Angell, 1985). And finally, for patients suffering from severe illness, the lure of positive thinking certainly presents a less painful and traumatic solution than does surgery, chemotherapy, or other medical procedures. Thus, their fear of the pain and suffering of proven medical treatment may bias them to put their faith in positive thinking instead of the more scientifically valid course of treatment.

Critical Thinking Applied: Do Childhood Vaccinations Increase Risk of Autism?

Autism spectrum disorders—more commonly known as autism—are a type of developmental disorder that causes severe impairment in social functioning and communication. Usually diagnosed in the first few years of life, this neurological disorder is estimated to affect about 1% of the population—and that number may be growing. With increased awareness of the nature and symptoms of this disorder, parents and researchers alike are increasingly focused on what causes this debilitating disorder, and whether it might be preventable. Most recently, that scrutiny has zeroed in on childhood vaccinations as a possible cause, and as a result more than 1 in 10 parents refuse or delay the vaccination schedule recommended by the U.S. Centers for Disease Control (CDC) and the American Medical Association (DeStefano and others, 2013). But are these parents making rational decisions, or they motivated by fear? What does scientific research reveal about the impact of vaccinations on risk of autism?

What Are the Critical Issues?

Certainly, all parents want their children to be healthy and to lead productive, fulfilling lives. So, the thought of their children developing a disease that severely restricts their ability to form and maintain close relationships in the traditional manner is frightening. But is refusing childhood vaccinations truly the way to avoid the risk of autism? What critical thinking questions do we need to ask to answer this important question?

What Is the Source?

Over the past 10 years, many popular media sources reported on the supposed connection between childhood vaccinations and autism. But as you know, the popular media is not always a reliable source. In this instance, they were often quoting a doctor who had published a book recommending his own schedule of vaccinations as an alternative to that of the CDC. The other primary spokesperson spreading the word about the risk of vaccinations was actress Jenny McCarthy. Thus, the sources lacked widespread medical credibility.

What Is the Evidence?

In 1998, a study published in the journal *Lancet* reported a connection between the MMR (measles-mumps-rubella) vaccine and autism (Wakefield and others, 1998). News organizations ran with the story, and doctors began reporting up to 50% of their patients reconsidering vaccinations for their children. That 1998 study, however, turned out to be false: Andrew Wakefield, the author of the study, had accepted hundreds of thousands of dollars from attorneys looking to prove that vaccines were unsafe—and what's more, the *British Medical Journal* later discovered that that Wakefield had actually fabricated his data (Offit & Moser, 2009)! Wakefield, a former surgeon, lost his medical license for these and a variety of other ethical violations, and the original article was retracted by *Lancet*. Since that time, numerous large-scale studies have extensively probed for connections between childhood vaccinations and autism, but to no avail—over and over, legitimate studies failed to find any relationship between the two (Taylor and others, 2014; Maglione and others, 2014). The international medical community is satisfied that vaccinating a child will not put that child at risk for autism. This illustrates, as well, the importance of replication, which is the fourth step in the scientific method.

Could Bias Contaminate the Conclusion?

You bet it did. At least three different types of bias were present in the autism/vaccinations myth. **Emotional bias** explains most of how one questionable study perpetuated an irrational panic that, even today, still causes some parents to refuse or delay vaccinations for their children. The fear of an uncontrollable disease, coupled with a simple solution—don't vaccinate—was a powerful combination that proved irresistible for many.

Second, confirmation bias played a role. Once the original (but later retracted) journal article was published in 1998, media outlets were bombarded by stories of parents who had children with autism stating that their children had indeed been vaccinated. Once parents had made up their minds about the relationship (facilitated by emotional bias), it became easy to remember those stories, but fail to notice or remember the many healthy children who had been vaccinated but had not developed autism.

The **correlation-causation bias** fed the fire as well. Proponents of the anti-vaccine movement pointed out that autism rates were rising right alongside the increase in childhood vaccinations—thus, they said, the two must be related. Good critical thinkers would have pointed out that correlation does not mean causation: in this case, expanded access to medical treatment could explain why more children were getting early vaccinations and also why autism was more frequently and reliably diagnosed.

Does the Issue Require Multiple Perspectives?

With any disease or disorder, we must look to both nature and nurture—biology and environment—to discern potential causes. Rarely is any medical or psychological condition a result of only one or the other, and rarer still are cases where one simple environmental condition (such as a vaccination) causes a complex disorder such as autism. In fact, a look at statistics gathered from persons with autism

reveals several genetic and hereditary risk factors (Jiang and others, 2013).

What Conclusions Can We Draw?

This example provides a powerful illustration of the importance of critical thinking. What's worse, unnecessary and irrational public panic over the supposed vaccinations-autism relationship has created a new threat to public health: As more parents refused to vaccinate their children, the diseases prevented by those vaccinations have increased in frequency. Measles, officially categorized as "eliminated" in the U.S. and U.K. more than a decade ago,

is reappearing in what some fear may become an epidemic: Hundreds of new cases were identified in the U.S. in 2014 and 2015, and thousands were affected in the U.K. Highly contagious, the disease is still common in many countries of Africa, Asia, and Europe, with more than 150,000 childhood deaths attributed to measles each year. Infected travelers can carry the virus with them into new countries, and without strong vaccination histories, the disease spreads. Health officials worry that the decades of success in reducing and even eliminating diseases such as whooping cough, diphtheria, and even polio might be erased if the current trend against vaccines doesn't reverse itself soon.

Summary: Mind, Behavior, and Psychological Science

Chapter Problem

How would psychology test the claim that sugar makes children hyperactive?

- Psychologists would use the *scientific method* to test this claim.
- In a *controlled experiment*—designed to show cause-and-effect—children would be assigned *randomly* to an *experimental group* or a *control group* and given a drink with sugar or a sugar substitute.
- Using a *double-blind* procedure to control for *experimenter bias* and the *placebo effect*, observers would rate each child's activity level.
- Analyzing the resulting *data* would show whether or not the *hypothesis* had been supported. If children who received the sugared drink were more active, we could conclude that sugar does make children hyperactive.

What Is Psychology—and What Is It *Not?*

Core Concept 1.1

Psychology is a broad field, with many specialties, but fundamentally, psychology is the science of behavior and mental processes.

All psychologists are concerned with some aspect of behavior and mental processes. Unlike the pseudosciences, scientific **psychology** demands solid evidence to back up its claims. Within psychology, there are many specialties that fall within three broad areas. **Experimental psychologists** primarily do research but often teach as well. Those who are primarily **teachers of psychology** work in a variety of settings, including colleges, universities, and high schools. **Applied psychologists** practice many specialties, such as industrial/organizational, sports, school, rehabilitation,

clinical and counseling, forensic, and environmental psychology. In contrast with psychology, **psychiatry** is a medical specialty that deals exclusively with mental disorders.

In the media, much of what appears to be psychology is actually **pseudo-psychology**. Noticing the difference requires development of **critical thinking skills**—which this book organizes around six questions to ask when confronting new claims that purport to be scientifically based:

- What is the source?
- Is the claim reasonable or extreme?
- What is the evidence?
- Could bias contaminate the conclusion?
- Does the reasoning avoid common fallacies?
- Does the issue require multiple perspectives?

What Are Psychology's Six Main Perspectives?

Core Concept 1.2

Six main viewpoints dominate modern psychology—the biological, cognitive, behavioral, whole-person, developmental, and sociocultural perspectives—each of which grew out of radical new concepts about mind and behavior.

Psychology's roots stretch back to the ancient Greeks. Several hundred years ago, René Descartes helped the study of the mind to become scientific, based on his assertion that sensations and behaviors are linked to activity in the nervous system—a step that ultimately led to the modern **biological perspective**, which looks for the causes of behavior in physical processes such as brain function and genetics. Biological psychology itself has developed in two directions: the fields of **neuroscience** and **evolutionary psychology**.

The formal beginning of psychology as a science, however, is traced to the establishment by Wundt of the first

psychological laboratory in 1879. Wundt's psychology, which American psychologists morphed into **structuralism**, advocated understanding mental processes such as consciousness by investigating their contents and structure. Another early school of psychology, known as **functionalism**, argued that mental processes are best understood in terms of their adaptive purposes and functions. Both were criticized for the use of **introspection**, which some psychologists found too subjective. Nevertheless, elements of these schools can be found in the modern **cognitive perspective**, with its interest in learning, memory, sensation, perception, language, and thinking and its emphasis on information processing.

The **behavioral perspective** emerged around 1900, rejecting the introspective method and mentalistic explanations, choosing instead to analyze behavior in terms of observable stimuli and responses. Proponents of **behaviorism**, such as John Watson and B. F. Skinner, have exerted a powerful influence on modern psychology with their demands for objective methods, insights into the nature of learning, and effective techniques for management of undesirable behavior.

Three rather different viewpoints make up the **whole-person perspective**, which takes a global view of the individual. Sigmund Freud's psychoanalytic approach, with its focus on mental disorder and unconscious processes, led to **psychoanalysis** and modern **psychodynamic psychology**. In contrast, **humanistic psychology**, led by Abraham Maslow and Carl Rogers, emphasizes the positive side of human nature. Meanwhile, **trait and temperament psychology** sees people in terms of their persistent characteristics and dispositions.

The **developmental perspective** calls attention to mental and behavioral changes that occur predictably throughout the life span. Such changes result from the interaction of heredity and environment. Alternatively, the **sociocultural perspective** argues that each individual is influenced by other people and by the culture in which they are embedded.

Modern psychology has changed rapidly over the past decades as the biological, cognitive, and developmental perspectives have become dominant. At the same time, adherents of different perspectives are joining forces. Another major change involves the increasing number of women and minority-group members entering the field.

How Do Psychologists Develop New Knowledge?

> **Core Concept 1.3**
>
> **Psychologists, like all other scientists, use the scientific method to test their ideas empirically.**

Psychology differs from the pseudosciences in that it employs the scientific method to test its ideas empirically. The **scientific method** relies on testable **theories** and falsifiable **hypotheses**. Research utilizing this scientific method can employ **experiments**, **correlational studies**, **surveys**, **naturalistic observations**, and **case studies**. Each method differs in the amount of control the researcher has over the conditions being investigated. Researchers can fall prey to **expectancy bias**. One way scientists control for bias in their studies is the double-blind method. Using the experimental method in large and well-controlled double-blind studies, researchers have failed to find evidence that links sugar to hyperactivity in children.

Psychologists follow a code of ethics, established by the American Psychological Association, for the humane treatment of subjects. Still, some areas of disagreement remain. These especially involve the use of deception and the use of animals as experimental subjects. Most recently, uses of social media websites (SMWs) to collect data and conduct experiments are coming under scrutiny as they challenge traditional methods of ensuring ethical standards.

Despite widespread acceptance of the scientific method, pseudo-psychological claims abound. Unchecked, pseudo-psychology can have harmful effects, as seen in the use of the lobotomy.

Critical Thinking Applied: Do Childhood Vaccines Cause Autism?

Immunizations are one of the greatest medical accomplishments of modern times, resulting in a drastic decrease in childhood and adult death rates. In recent years, however, fewer parents are vaccinating children for fear that the vaccines will cause autism. An examination of the science reveals no evidence to support that fear, and identifies several critical thinking errors made by anti-vaccine proponents. The anti-vaccine movement has resulted in a resurgence of diseases formerly eliminated in the U.S., such as measles.

Chapter 2
Biopsychology, Neuroscience, and Human Nature

Behold the human brain in essence, the basis of all human thought, emotion, behavior, and understanding.

⌄ Core Concepts

2.1 Evolution has fundamentally shaped psychological processes because it favors genetic variations that produce adaptive behavior.

2.2 The brain coordinates the body's two communications systems, the nervous system and the endocrine system, which use similar chemical processes to communicate with targets throughout the body.

2.3 The brain is composed of many specialized modules that work together to create mind and behavior.

"I was living large," says Dr. Jill Bolte Taylor, also known as the *Singing Scientist* (Taylor, 2009, p. xiv). At age 37, the Harvard Medical School brain anatomist had won numerous awards and was recognized nationwide for her breakthrough research on the brain's involvement in mental illness. Then, on a cold December morning, her life abruptly changed.

When Jill first awoke that fateful day, she noticed a painful pounding in her head that felt like a severe headache. As she tried to go about her normal morning routine, however, she began to notice odd changes in her body and her mind. Stepping into the shower became a focused effort in coordination. Her body felt strange; the sound of the water was a deafening roar, and the overhead light seared her eyes. As she tried to think rationally and figure out what was happening, she couldn't keep her thoughts on track. Instead, she found herself irresistibly

distracted by a newfound fascination with the movement of her body parts.

> "As I held my hands up in front of my face and wiggled my fingers, I was simultaneously perplexed and intrigued. Wow, what a strange and amazing thing I am . . . I was both fascinated and humbled by how hard my little cells worked, moment by moment . . . I felt ethereal" (pp. 42–43).

Then, her right arm became paralyzed, and suddenly she knew:

> "Oh my gosh, I'm having a stroke!"

—followed immediately by a notion perhaps only a brain scientist would consider at a time like that:

> "Wow, this is so cool!" (p. 44)

Over the next few hours, Jill struggled to figure out how to get help. She was no longer aware that calling 911 would bring emergency treatment, nor could she recognize the numbers on a telephone keypad. When she finally reached a coworker—after spending a full hour deciphering how to call for help—she discovered that not only did she not understand his words, he could not understand hers: She had lost her ability to speak and to understand language. Fortunately, her coworker recognized her voice, but the several hours it took for Jill to get to a hospital took a profound toll on her brain. The massive stroke she had suffered leaked blood throughout the left side of her skull, creating a toxic environment for millions of brain cells. She could not sit up or walk without assistance. She could hear, but sounds were merely noise; she could not make sense out of them. She could see, but could not distinguish color or determine whether a crack in the sidewalk was dangerous. She could not communicate with others. She didn't even recognize her own mother.

Remarkably, though, Jill gradually recovered. Despite the extensive damage to her brain, she has returned to her career as a neuroanatomist, teaching at Indiana University School of Medicine and traveling as a national spokesperson for the Harvard Brain Bank. Jill also finds time for activities she never did before: she water skis, plays guitar, and creates works of art that are uniquely representative of her experiences: anatomically correct stained glass brains. On the outside, observers see no signs of the traumatic brain injury she survived. On the inside, however, Jill is not the same person. Her injury and recovery rewired her brain, and with the rewiring came a different perspective on life and different personality traits.

> "I may look like me, and I may sound like me, but I'm different now, and I had to accept that," she states with grace and conviction. "I believe [Einstein] got it right when he said, 'I must be willing to give up what I am in order to become what I will be'" (p. 185).

In an important sense, we *are* the "wiring" of our brains.

The Wondrous Three-Pound Organ That Makes Us Human

> **CHAPTER PROBLEM:** What does Jill's experience teach us about how our brain is organized and about its amazing ability to adapt?

What do we know about the human brain? In simplest terms, it is about the size of a cauliflower, it weighs about 3 pounds, and it has a pinkish-gray and wrinkled surface. But such bald facts offer no hint of the brain's complex structure and astounding capabilities. Some 100 billion *neurons* (nerve cells), each connecting with up to 10,000 other neurons, make the human brain the most complex structure known. Our largest computers seem primitive by comparison.

At birth, you actually had far more neurons than you do now. Many of them have been pruned away, probably from disuse in the first few years of your life. (Don't worry. It happens to everyone!) In adolescence, the number stabilizes and then remains essentially the same throughout adulthood as some cells die and others develop on a daily basis (Gage, 2003).

As for its capabilities, the human brain uses its vast nerve circuitry to regulate all our body functions, control our behavior, generate our emotions and desires, and process the experiences of a lifetime. Most of this activity operates unconsciously behind the scenes—much like the inner workings of your cell phone. Yet when disease, drugs, or accidents destroy brain cells, the biological basis of the human mind becomes starkly apparent. It is then that we realize the critical role of biology in human sensation and perception, learning and memory, passion and pain, reason—and even madness.

Most remarkable of all, perhaps, the human brain has the ability to think about itself. This fact fascinates specialists in **biopsychology,** who work in a rapidly growing field that lies at the intersection of biology, behavior, and mental processes. Biopsychologists often collaborate with cognitive psychologists, biologists, computer scientists, chemists, neurologists, linguists, and others interested in the connection between brain and mind. The result is a vibrant interdisciplinary field known as **neuroscience** (Kandel & Squire, 2000).

Looking at mind and behavior from this **biological perspective** has produced many practical applications. For example, we now know that certain parts of the brain control sleep patterns—and as a result, we now have effective treatments for a number of formerly untreatable sleep disorders. Likewise, the effects of some psychoactive drugs, such as cocaine, heroin, and methamphetamine, make sense now that we understand how these drugs interact with chemicals produced by the brain. And, as we will see, recent discoveries involving **mirror neurons**, brain implants, the genetic code for human life, and the biological basis of memory promise many more benefits for people who live with brain disease.

Our exploration of biopsychology and neuroscience will begin at the most basic level and then move into more specific areas of focus:

1. First, we will consider the twin domains of genetics and evolution, both of which have shaped our bodies and minds.
2. Then we will examine the endocrine system and the nervous system, the two communication channels carrying messages throughout the body.
3. Finally, we will focus on the brain itself.

By reading this chapter, you will come to understand how Jill Bolte Taylor recovered from the massive damage to her brain, yet became a fundamentally different person—in a sense, a person with even greater humanity than she experienced before her stroke. More important, you will learn how biological processes shape your every thought, feeling, and action.

Key Question: How Are Genes and Behavior Linked?

Core Concept 2.1

Evolution has fundamentally shaped psychological processes because it favors genetic variations that produce adaptive behavior.

Just as fish have an inborn knack for swimming and most birds are built for flight, we humans also have *innate* (inborn) abilities. At birth, the human brain emerges already "programmed" for language, social interaction, self-preservation, and many other functions—as we can readily see in the interaction between babies and their caregivers. Babies "know," for example, how to search for the breast, how to communicate rather effectively through coos and cries, and, surprisingly, how to imitate a person sticking out her tongue.

How did such potential come to be woven into the brain's fabric?

The answer rests on the concept of **evolution**, the process by which succeeding generations of organisms change as they adapt to changing environments. We can observe evolution in action even on a microscopic level, when an antibiotic fails to work on a strain of bacteria that has evolved a resistance. When it comes to larger and more complex organisms, change occurs over much longer periods of time as these organisms adapt to changing climates, predators, diseases, and food supplies. In our own species, for example, change has favored large brains suited to language, complex problem solving, and social interaction.

The core concept for this section makes this evolutionary process the link between genetics and behavior.

> Evolution has fundamentally shaped psychological processes because it favors genetic variations that produce adaptive behavior.

Our explanation of evolution begins in this section with the story of Charles Darwin, who contributed the concept of evolutionary change to the world. Next, we will build on Darwin's insight with a look at *genetics,* which involves the molecular machinery that makes evolution work. Finally, we will explore the fascinating new science of epigenetics, which is beginning to reveal how our environment acts upon our genetic framework to shape our outcomes in areas ranging from intelligence to health and disease—and ultimately influencing our very longevity.

By the end of this section, you will be able to:

2.1 Describe Darwin's theory of evolution and natural selection

2.2 Illustrate the role of the genotype and the phenotype in making each person a unique individual

2.3 Explain how the science of epigenetics illuminates the way environmental forces alter gene expression

2.1: Evolution and Natural Selection

Objective: Describe Darwin's theory of evolution and natural selection

Although he trained for careers in both medicine and the ministry, Charles Darwin's greatest love was nature. He was thrilled, then, when in 1831 (with help from his botany professor) he landed a job as a "gentleman companion" aboard the *Beagle* (Phelan, 2009), a British research vessel surveying the coastline of South America. Darwin quickly became seasick, however, which made being on the ship unbearable, so he spent as much time as possible on land. Following his passion, he began studying the native species, collecting numerous specimens and keeping detailed records of the unusual life forms he found. Struck by the similarities among the various animals and plants he studied, Darwin wondered if they could possibly be related to each other, and furthermore, if all creatures, including humans, might share a common ancestry.

He knew this notion flew in the face of accepted scholarship, as well as the religious doctrine of creationism. So, in his famous book *On the Origin of Species* (1859), Darwin carefully made the case for the evolution of life. And controversial it was. The essential features of his argument, however, withstood withering attacks, and eventually his theory of evolution created a fundamental change in the

way people saw their relationship to other living things (Keynes, 2002; Mayr, 2000).

2.1.1: The Evidence That Convinced Darwin

What was the evidence that led Darwin to his radical conclusion about the evolution of organisms? Again and again on the voyage, he observed organisms exquisitely adapted to their environments: flowers that attracted certain insects, birds with beaks perfectly suited to cracking certain types of seeds. But he also observed *variation* among individuals within a species—just as some humans are taller than others or have better eyesight (Weiner, 1994). It occurred to Darwin that such variations could give one individual an advantage over others in the struggle for survival and reproduction. This, then, suggested a mechanism for evolution: a "weeding out" process he called **natural selection**. By means of natural selection, those individuals best adapted to their environment are more likely to flourish and reproduce, while the poorly adapted tend to leave fewer offspring, or their line may die out altogether. (You may have heard this described as *survival of the fittest,* a term Darwin disliked.) Through natural selection, then, a species gradually changes as it adapts to the demands of its environment (Figure 2.1).

2.1.2: Evolutionary Explanations for Psychological Processes

This process of adaptation and evolution helps us make sense of many observations we make in psychology. For example, human *phobias* (extreme and incapacitating fears) most often involve stimuli that signaled danger to our ancestors, such as snakes, heights, and lightning (Hersen & Thomas, 2005). In the same way, the fact that we spend about a third of our lives asleep makes sense in evolutionary terms: Sleep kept our ancestors out of trouble in the dark. Evolution also explains our innate preferences and distastes, such as the attractiveness of sweets and fatty foods (good sources of valuable calories for our ancestors) and a dislike for bitter-tasting substances (often signaling poisons).

Evolution is, of course, an emotionally loaded term and, as a result, many people have a distorted understanding of its real meaning. For example, some believe that Darwin's theory says humans "come from monkeys." But neither Darwin nor any other evolutionary scientist has ever said anything like that. Rather, they say people and monkeys had a common ancestor millions of years ago—a big difference. Evolutionary theory says that, over time, the two species have diverged, each developing different sets of adaptive traits. For humans, this meant developing a big brain uniquely adapted for language (Buss and others, 1998).

Figure 2.1 Natural Selection in Galapagos Turtles

These two giant tortoises from the Galapagos Islands illustrate Darwin's observation that species evolve to best survive in their unique environments. *What differences do you spot in their physical characteristics that inform you of their unique environments?*

We should be clear that the basic principles of evolution, although still controversial in some quarters, have been accepted by virtually all scientists for more than a century. That said, we should also note that evolutionary theory is a sometimes-controversial newcomer to psychology. It is not that psychologists dispute Darwin—most do not. In fact, evolutionary psychology may provide an elegant solution to the **nature–nurture** debate, by its premise that behavior evolves from the interaction of heredity and environmental demands (Yee, 1995). Some worry, however, that recognition of a prominent genetic role in behavior may raise the question of whether genetics absolves us of our responsibility for troublesome behaviors such as aggression or addiction—a question to which evolutionary psychologists resoundingly reply, "No!" (Hagen, 2004). Just because a behavior may have a biological basis does not mean the behavior cannot be changed. As we will explore in later chapters, there are many tried-and-true techniques for changing behaviors—regardless of their origin.

In later chapters, we will discuss specific evolutionary theories that have been advanced to explain aggression,

g. Paranoia
h. Anxiety

▶   The response entered here will appear in the
    performance dashboard and can be viewed by
    your instructor.

[Submit]

2.2: Genetics and Inheritance

Objective: **Illustrate the role of the genotype and the phenotype in making each person a unique individual**

In principle, the genetic code is quite simple. Much as the microscopic pits in a CD encode information that can become pictures or music, your *genes* encode molecular information that can become inherited traits. Consider your own unique combination of physical characteristics. Your height, facial features, and hair color, for example, all stem from the encoded genetic "blueprint" inherited from your parents and inscribed in almost every cell in your body. Likewise, genetics influences psychological characteristics, including your basic temperament, tendency to fears, and certain behavior patterns (Pinker, 2002).

Yet, even under the influence of heredity, you are a unique individual, different from either of your parents. One source of your uniqueness lies in your experience: the environment in which you grew up—distinct in time and, perhaps, in place from that of your parents. Another source of difference between you and either of your parents arises from the random combination of traits, both physical and psychological, each parent passed on to you from past generations in their own family lines. (It is important to note you do not inherit copies of *all* your father's and mother's genes. Rather, you get half of each, randomly shuffled.) This hybrid inheritance produced your unique **genotype**, the genetic pattern that makes you different from anyone else on earth. Still, as different as people may seem, 99.9% of human genetic material is the same (Marks, 2004).

If the genotype is the "blueprint," then the resulting structure is the **phenotype**. Your phenotype includes all your observable physical and psychological characteristics, such as your height, hair color, athleticism, and personality (to name a few). And, although the phenotype is based in biology, it is not completely determined by heredity. Heredity always acts in partnership with the environment. So, for example, such factors as nutrition, disease, stress, and other life experiences interact with our biological traits to influence the person each of us becomes. The environment even plays a role before our birth, such as when a toxin or virus causes a birth defect. All of these

More than 98% of our genetic material is also found in chimpanzees (Pennisi, 2007). This supports Darwin's idea that humans and apes had a common ancestor.

jealousy, sexual orientation, physical attraction and mate selection, parenting, cooperation, temperament, morality, and (always a psychological hot potato) gender differences. For now, though, we invite you to apply what you have learned in this section about natural selection and adaptation to an environment in the following journal.

WRITING PROMPT

Applying Evolutionary Psychology

Choose one of the behaviors listed below and discuss how that behavior might be adaptive, enabling a human to better survive and thrive in a particular environment.

a. Jealousy
b. Aggression
c. Helping others
d. Honesty
e. Dishonesty
f. Gender differences (choose just one as an example)

environmental effects help explain why identical twins, who share the same genotype, are not identical in their phenotypes. A bit later in this section, we will explore the emerging science of epigenetics, which is beginning to reveal the mechanics of this genetics–environment interaction.

But first, let's take a closer look at the components that make up our genetic base.

2.2.1: Chromosomes, Genes, and DNA

The blockbuster film *Jurassic Park* and its ongoing series of sequels rely on a clever twist of plot in which scientists use genetic sequencing to create dinosaurs, resulting in an island full of reptilian horrors. The stories, of course, are science fiction, yet the films rest on an important scientific fact that sets the stage for understanding of the genetic foundations of our own species: Almost every cell in our body carries a complete set of biological instructions for building the organism. For an overview of this important structure, spend a few minutes studying Figure 2.2, and then use it to help you understand the next few paragraphs as they explain the process in more detail.

Like the string of words in this paragraph, genes occur in sequence on the chromosomes. But chromosomes are much more than strings of genes. Like paragraphs, they also contain "punctuation" that indicates where each gene begins and ends, along with commands specifying how and when the genes will be expressed, or activated (Gibbs, 2003). Sometimes, however, these commands are wrong, or the genes themselves have defects. The resulting errors in gene expression can cause physical and developmental problems, such as cerebral palsy, Down syndrome, or simple color blindness.

Each gene contributes to the operation of an organism by specifying a single protein. Thousands of such proteins, in turn, serve as the building blocks for the organism's physical characteristics (part of the phenotype) and the regulation of the body's internal operations. Because they differ slightly from one individual to another, genes provide the biological source for the variation among individuals that caught Darwin's attention.

On a still smaller scale, genes are composed of even tinier molecular units called *nucleotides* that serve as individual "letters" in the genetic "words." Instead of a 26-letter alphabet, though, the genetic code uses just four nucleotides. Consequently, a particular gene may require hundreds of nucleotides strung together in a unique pattern to specify a particular protein. You can see why, then, the decoding of the human genome is so exciting to scientists: It mapped the complete nucleotide pattern for all of the approximately 25,000 genes in the human organism, including multiple variations of patterns on each gene to account for individual differences! Results offer great hope for better understanding and treatment of physical and psychological disorders.

Of the 46 chromosomes (23 pairs), two warrant special mention: the **sex chromosomes**. Named X and Y for their shapes, these chromosomes carry genetic encoding for a male or female phenotype. We all inherit one X chromosome from our biological mothers. In addition, we receive either an X or a Y from our biological fathers. When they pair up, two X chromosomes (XX) contain the code for femaleness, while an XY pair codes for maleness. In this sense, then, the chromosome we get from our fathers— either an X or a Y—determines our biological sex.

2.2.2: Genetic Explanations for Psychological Processes

Most of our discussion of heredity and genetics could apply equally to fruit flies and butterflies, hollyhocks and

Figure 2.2 DNA, Genes, and Chromosomes

Encoded in short segments of DNA are **genes**, which you might think of as the "words" that make up each organism's instruction manual.

Genome

Cell

Chromosome

DNA
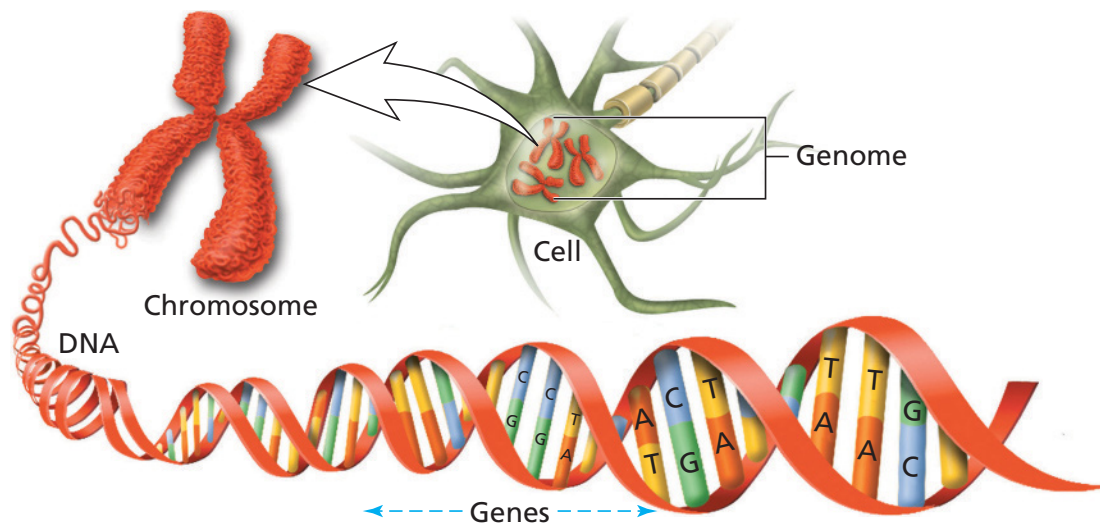
Genes

humans. All organisms follow the same basic laws of heredity. The differences among species arise, then, from different genetic "words"—the genes themselves—"spelled" with the same four letters (nucleotides) of life's universal four-letter alphabet. In other words, those same four nucleotides, arranged in different patterns and orders, form the genetic code for all the species on our planet!

And what does all this have to do with psychology? Simply put, genes influence our psychological characteristics just as they do our physical traits. Genes can affect such diverse human attributes as intelligence, personality, mental disorders, reading and language disabilities, and (perhaps) sexual orientation. Even our fears can have some genetic basis (Hariri and others, 2002). But, because genetic psychology is still a field in its infancy, we are just beginning to learn how and to what extent specific genes are involved in most psychological processes (Rutter, 2006). And, although some disorders (such as cystic fibrosis) can be traced to a single genetic mutation, most involve multiple genes, which complicates the task of identifying gene-behavior connections (National Human Genome Research Institute, 2012).

So, does this mean that heredity determines our psychological destiny? Will you grow up to be like your Uncle Fred? Not to worry. Although you may share many of his genes, your heredity never acts alone. Heredity and environment always work together to influence our behavior and mental processes (Pinker, 2002). Jill Bolte Taylor's intelligence, for example, almost certainly has a genetic component (her mother went to Harvard and her father has a doctoral degree), but was further nurtured in her childhood environment and educational opportunities. Her ability to overcome the challenges of her stroke, construct a new life, and go on to become one of Time Magazine's "100 Most Influential People in the World" (2008) illustrates her creativity, a trait she attributes to her father—but that was also undoubtedly enhanced by her training as a scientist.

2.3: The Brave New World of Epigenetics

Objective: **Explain how the science of epigenetics illuminates the way environmental forces alter gene expression**

So, now you know that you are a unique combination of your genetic contributions and your environment. The centuries-old question of "Nature or Nurture?" has become obsolete, and in its place we now have the statement, "Nature *and* Nurture." But there's more: 21st-century science is learning that not only does environment help shape our outcomes (in other words, our **phenotype**), but—remarkably—it can also impact us on a cellular level. That's right. Influences from our environment, such as stress and

nutrition, can dictate how our genes work. As a result, it isn't enough to say "Nature and Nurture" any longer; instead, we must say, "Nature and Nurture *and* Nurture's Impact on Nature!" Confused? You probably aren't alone. Let us explain this complicated—yet very exciting—new science, known as **epigenetics,** which studies how environmental forces alter gene expression.

2.3.1: Genome Basics

First, let's briefly recap what we know about the genome. Your genome is your own personal genetic code, the result of the random shuffling of genes from each of your birth parents. That individual genome, or "blueprint," is encoded in almost every cell in your body, written on your DNA molecules. Each of us has more than 25,000 genes in our genome, distributed throughout some 3 billion pairs of DNA in each cell.

2.3.2: More About the Genome

Now, let's add a couple of new concepts to that basic outline, starting with a surprising feature of DNA: Did you know that a single DNA molecule is actually about as tall as an average adult? How, then, do the billions of DNA pairs squeeze themselves into every tiny cell in our bodies? The answer lies in the double-helix structure of DNA: DNA molecules are twisted into tight coils, so that a 5- to 6-foot strand of DNA actually takes only a tiny fraction of that space. (Imagine having a long piece of string, and then twisting it around and around and around, so it starts to coil, and then coils form on top of coils, and so on. Eventually, that string would take up far less physical space than it did when it was stretched out.) As the DNA compresses and coils, it wraps itself around a special protein called a **histone**—rather like a length of thread wraps around a spool (Figure 2.3).

And here's a fun fact: If all your DNA molecules were stretched out end-to-end, the length could traverse the distance to the sun and back—twice!

Next, let's ask another question: If all our cells contain the same set of genes (which they do), how is it possible that the individual cells develop differently? For example, how do some cells become skin cells, other cells become muscles, and still others become neurons in your brain? The answer comes from both nature and nurture: Signals from inside our bodies, as well as signals from our environment, turn certain genes "on" and other genes "off" in a particular cell. So, for example, as a fetus develops, signals inside the fetal body direct certain cells to become skin, muscle, and so forth, by activating certain genes and deactivating others. Then, once the baby is born, biological signals from inside continue to direct development as the baby becomes a child, the child an adolescent, and the adolescent an adult, throughout the life span. In addition

---

Figure 2.3 How Our Experiences and Environment Impact Our DNA

DNA wraps itself around proteins called histones. As internal and external signals direct some genes to be turned on or off, chemical tags are left behind, changing the physical structure of the genome. These chemical tags create the epigenome.
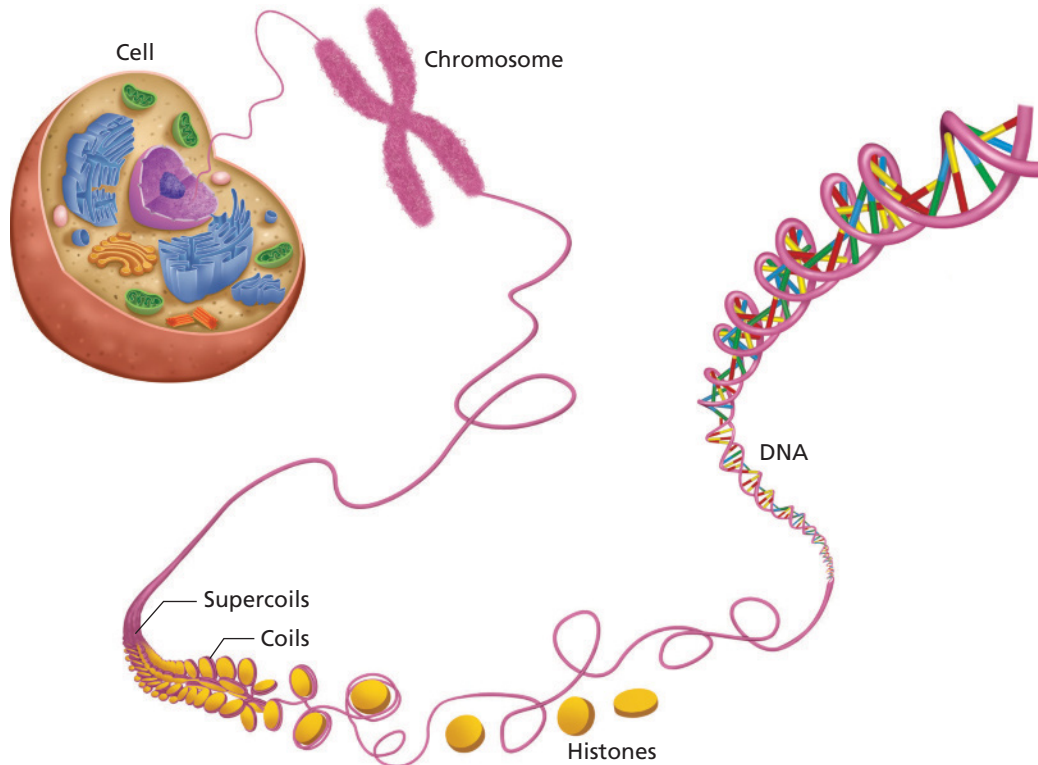
to these internal communications, the cells receive signals from the environment, so that exposure to various experiences is also transmitted to the genome to enable the activation and deactivation of various genes.

Throughout our development and our life, then, these internal and external signals are turning genes on and off. Each time that happens, a chemical tag is left behind as a sort of record of what happened, creating essentially a memory log of all the influences on that particular cell. Some of the tags are deposited on the DNA, and others on the histone. It is these residual chemical tags that make up the **epigenome**—"epi" meaning "above"—so in essence the epigenome is a set of "annotations" on the original blueprint. And while the original blueprint—our DNA—remains the same throughout our life, the epigenome is flexible, adapting to the environment by turning genes on and off in response to the organism's experiences.

2.3.3: How Life Experiences Change the Epigenome

It probably comes as no surprise that parenting plays an important role in a child's development and outcomes, and epigenetics research has recently discovered new science to help explain why. Early studies in this area focused on maternal behavior of rats with their newborn pups. Some of the mother rats licked and groomed their pups extensively, while others did very little (this is a normal variation in parenting behavior). Rat pups that were groomed and licked frequently by their mothers grew into relaxed and easy-going adults, while those that received little maternal licking were more anxious, easily stressed, and even aggressive. Further examination of the epigenetic sequences of these rats revealed that the early maternal licking and grooming had caused greater expression of the genes that help turn off the stress response. So, when the rats raised by attentive mothers experienced normal stress, their bodies coped with the stress more effectively and returned to a normal state more quickly than did their lab-mates raised by less attentive mothers (Francis and others, 1999, Weaver and others, 2004).

Why does it matter how rats cope with stress?

Rat physiology is remarkably similar to human physiology, and one thing we know about stress in both rats and humans is that the longer the stress response lasts, the more potential damage to the cardiovascular system—hence, for example, the well-established relationship between stress and heart disease. And in humans, we've known for 20 years that infant massage reduces anxiety and production of stress hormones in both healthy and at-risk babies (Field, 1995). A similar epigenetic mechanism may be work in both cases: The physiological stimulation of licking and grooming in rats, like massage in infants, enables development of a more effective stress response system.

These findings also illustrate the **adaptive** nature of early parental care on the infant (be it rodent or human). Infants raised by attentive mothers in a rich environment (with plenty of food and few dangers) develop stress response systems well-suited to a safe and nurturing environment: It's as if the nurturing mother is signaling that the environment is healthy, so there is no need to be anxious. And that is exactly what is happening—her behavior is impacting her pups' epigenome in a way that increases the pups' chances of survival. Anxiety, however, could be beneficial in a more threatening environment where, for example, food is scarce, so the anxiety-prone rat raised by a less nurturing mother may simply be developing in a manner better suited to survival in its more challenging environment. Higher anxiety keeps us more alert to potential danger and predators.

Of course, anxiety is not always advantageous, nor is human parenting behavior always beneficial to infants and children. Child abuse and neglect is a disturbing illustration. Could these studies with rats indicate that abuse or neglect might put a child at risk for anxiety and stress-related illness? Recent research in humans has suggested just that: Postmortem examinations of the brains of suicide victims who were abused as children reveal brain changes associated with prolonged stress response. Suicide victims who did not suffer abuse as children, however, show normal stress response patterns in their brains (McGowan and others, 2009). Childhood experiences, then, may indeed cause epigenetic modifications that influence how the brain develops.

Exercise, nutrition, and toxins can also influence the process by which genes are expressed (turned on or off). One study found that 2 hours of aerobic activity per week silenced the expression of some genes associated with obesity and type-2 diabetes after 6 months of the exercise program (Ronn and others, 2013). Regular exercise also helps limit the expression of genes related to chronic inflammation, a condition related to a variety of diseases including asthma, heart disease, autoimmune disorders, gum disease, chronic pain, arthritis, dementia, and various types of cancer (Ntanasis-Stathopoulos and others, 2013).

Studies of the effects of diet on the epigenome are still in their infancy, but scientists do know that the food fed to honeybee larvae—which are genetically identical—determines whether they will develop into sterile worker bees or fertile queens (Kucharski and others, 2008). Larvae destined to be queens get fed large amounts of royal jelly, which helps them develop fertile ovaries, while other larvae get less royal jelly and thus become sterile worker bees. Also, certain food components found in broccoli, brussels sprouts, and garlic appear to reduce growth of cancer cells via changes to the epigenome (Do and others, 2010). Exposure to air pollutants has been shown to impact the epigenome as well and is under investigation for diseases ranging from lung and respiratory diseases to cancers to **schizophrenia** (Silveyra and others, 2012).

In summary, then, this epigenetic research provides scientific evidence of what our elders have long admonished: You are what you eat! It also reveals the mechanics behind other findings we've known about for years, such as the impact of human touch on infants and children, and of exercise on health and aging. And a few studies indicate that these epigenetic changes can even be passed down to our offspring, so that environmental conditions (such as starvation, stress, or toxins) parents are exposed to can leave a lasting imprint on the genome of their children and even their grandchildren. Stay tuned for continuing developments as this hot area of research continues to expand.

Psychology Matters

Choosing Your Children's Genes

Scientists already have the ability to control and alter the genetics of animals, like Dolly, the late and famous fatherless sheep, cloned from one of her mother's cells in 1996. Since that time, a variety of animals from cats to cattle have been cloned, though the success rate is just 1% to 2% of attempts (American Medical Association, 2010). But what about the prospects for genetic manipulation in people? What are the possibilities, and what challenges do they present?

As the genome becomes better understood, researchers are learning about the genetic basis for human differences in abilities, emotions, and resistance to stress (Kosslyn and others, 2002). High on the list are disorders that affect millions: cancer, heart disease, autism, and depression. Already, we can sample fetal cells and search for certain genetic problems, such as Down syndrome, various types of muscular dystrophy, and sickle-cell anemia. And while many people support genetic testing, others wonder if technology is advancing faster than our ability to address the ethical issues it presents. What are some examples of how technology is currently being used to select for certain genes?

One such technique, known as preimplantation genetic diagnosis (PGD), was developed to help couples decrease the risk of passing on a serious genetic disorder to an unborn child. By testing the fetus or embryo at a very early stage, reproductive scientists can ensure a genetically healthy fetus. Since its introduction in 1990, however, use of PGD has broadened. The United States and some other countries now allow use of PGD for sex selection: Almost half the clinics that offer PGD also offer parents the option to choose whether they will have a boy or a girl (Adams, 2010). Moreover, "savior siblings" are being engineered, so parents who have a child with a life-threatening disease (such as leukemia) can give birth to a sibling with the

right bone marrow to save the ill child (Marcotty, 2010). And, several years ago, a fertility clinic in Los Angeles announced its plans to offer genetic selection for physical traits such as height, hair color, and skin color (Naik, 2009). (Interestingly, the clinic retracted its offer after receiving a letter of objection from the Vatican.) But what will be the price of this technology?

Undoubtedly, many parents in this new genetic world will want their children to be smart and good looking—but by what standards will intelligence and looks be judged? And will everyone be able to place an order for their children's genes—or only the very wealthy? You can be certain the problems we face will be simultaneously biological, psychological, political, and ethical (Patenaude and others, 2002).

Already, psychologists provide guidance about how genetic knowledge can best be applied (Bronheim, 2000), particularly in helping people assess genetic risks in connection with family planning. We invite you to grapple with these issues by answering one of the questions in the following Journal. These questions, of course, have no "right" answers; however, your answers will help you define your own stand on some of the most important issues we will face in this century.

WRITING PROMPT

Choosing Your Children's Genes

If you could select three genetic traits for your children, which ones would you select? How would the world be affected if many people selected the same traits?

▶ | `The response entered here will appear in the performance dashboard and can be viewed by your instructor.`

Submit

Key Question: How Does the Body Communicate Internally?

Core Concept 2.2

The brain coordinates the body's two communications systems, the nervous system and the endocrine system, which use similar chemical processes to communicate with targets throughout the body.

Imagine this: You are driving on a winding mountain road, and suddenly a car comes directly at you. At the last instant, you and the other driver swerve in opposite directions. Your heart pounds—and keeps pounding for several minutes after the danger has passed. Externally, you have avoided a potentially fatal accident. Internally, your body has responded to two kinds of messages from its two communication systems.

One is the fast-acting *nervous system*, with its extensive network of nerve cells carrying messages in pulses of electrical and chemical energy throughout the body. This first-responder network comes quickly to your rescue in an emergency, carrying orders that accelerate your heart and tense your muscles for action. The other communication network, the slower-acting *endocrine system*, sends follow-up messages that support and sustain the response initiated by the nervous system. To do this, the endocrine glands, including the pituitary, thyroid, adrenals, and gonads, use chemical messengers we call *hormones*.

The two internal message systems cooperate not only in stressful situations but also in happier circumstances of high arousal, as when you receive an unexpected "A" on a test or meet someone especially attractive. The endocrine system and nervous system also work together during states of low arousal to keep vital body functions operating smoothly. Managing this cooperation between the endocrine system and the nervous system is the body's chief executive, the brain—which brings us to the core concept for this section.

> The brain coordinates the body's two communications systems, the nervous system and the endocrine system, which use similar chemical processes to communicate with targets throughout the body.

Why is this notion important for your understanding of psychology?

For one thing, these two communication systems are the biological bedrock for everything we think, feel, and do. Another reason for studying the biology behind the body's internal communications is to better understand how drugs, such as caffeine, alcohol, ecstasy, and Prozac, can change the chemistry of the mind. Finally, it will help you understand many common brain-based conditions, such as stroke, multiple sclerosis, and clinical depression.

Our overview of the body's dual communication systems first spotlights the building block of the nervous system: the neuron. Next, we will see how networks of neurons work together as modular components of the greater network of the nervous system that extends throughout the body. Then we will shift our attention to the endocrine system, a group of glands that operates together and in parallel with the nervous system—also throughout the body.

By the end of this section, you will be able to:

2.4 Describe the communication and developmental processes of the neuron.

2.5 Distinguish between the central nervous system and the peripheral nervous system

2.6 Examine how hormones serve as the communication channel among the glands of the endocrine system

2.4: The Neuron: Building Block of the Nervous System

Objective: **Describe the communication and developmental processes of the neuron.**

Like transistors on a microchip in your computer, neurons or nerve cells are the fundamental processing units in your brain. In simplest terms, a **neuron** is merely a cell specialized to receive and process information and transmit it to other cells. And neurons do that very efficiently: A typical nerve cell may receive messages from a thousand others and, within a fraction of a second, decide to "fire," passing the message along at speeds up to 300 feet per second to another thousand neurons—or sometimes as many as 10,000 (Pinel, 2005).

2.4.1: Types of Neurons

Although neurons vary in shape and size, all have essentially the same structure, and all send messages in essentially the same way. There are, however, three major classes of neurons according to their location and function: **sensory neurons**, **motor neurons**, and **interneurons** (Figure 2.4). Sensory neurons, or *afferent neurons*, act like one-way streets that carry traffic from the sense organs *toward* the brain. Accordingly, afferent neurons treat the brain to all your sensory experience, including vision, hearing, taste, touch, smell, pain, and balance. For example, when you test the water temperature in the shower with your hand, afferent neurons carry the message toward the brain.

In contrast, motor neurons, or *efferent neurons,* form the one-way routes that transport messages *away* from the brain and spinal cord to the muscles, organs, and glands. Motor neurons, therefore, carry the instructions for all our actions. So, in our shower example, the motor neurons deliver the message that tells your hand just how much to move the shower control knob.

Sensory and motor neurons rarely communicate directly with each other, except in the simplest of reflexive circuits. Instead, they usually rely on the go-between interneurons (also shown in Figure 2.4), which make up most of

---

Figure 2.4 Sensory Neurons, Motor Neurons, and Interneurons

Information about the water temperature in the shower is carried by thousands of **sensory neurons** (afferent neurons) from the sense organs to the central nervous system. In this case, the message enters the spinal cord and is relayed by **interneurons** to the brain. There, the information is assessed and a response is initiated ("Turn the water temperature down!"). These instructions are sent to the muscles by means of **motor neurons** (efferent neurons). Large bundles of the message-carrying fibers from these neurons are called *nerves*.
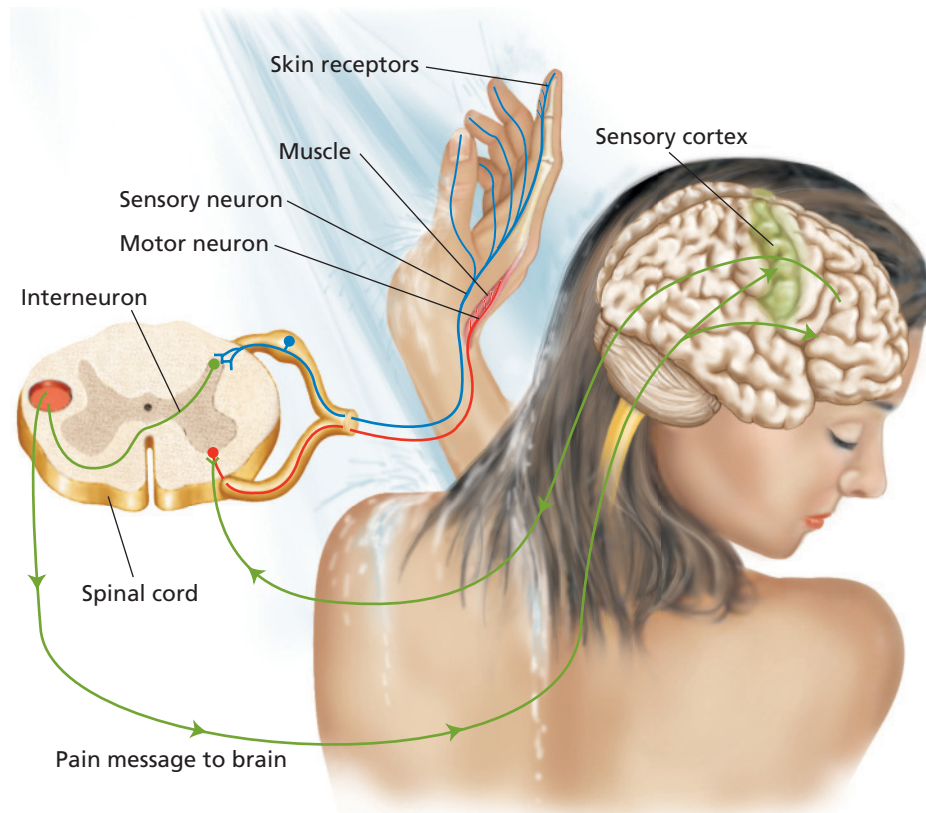
the billions of cells in the brain and spinal cord. Interneurons relay messages from sensory neurons to other interneurons or to motor neurons, sometimes in complex pathways. In fact, the brain itself is largely a super network of intricately connected interneurons.

2.4.2: How Neurons Work

Before we launch into a description of how neurons work, we have a short video to show you that will illustrate the process. Don't worry when the narrator uses terms you haven't learned yet—we will explain them all after the video. By viewing the video first, you'll be much better able to understand and visualize the details of the process as we describe them in the next paragraphs.

WATCH The Nimble Neuron

100 billion neurons work tirelessly around the clock to keep us functioning, and each one can communicate with as many as 10,000 other neurons—all at the same time! It's an amazing feat.

So, now you know the structures of a neuron, starting with the **dendrites**, which act as receivers to accept most incoming messages. Just as branches of a tree extend outward to help collect sun and light, these dendritic fibers extend outward from the cell body, where they act like a net, collecting messages from other neurons or through direct stimulation of the sense organs (such as the eyes, ears, or skin).

Dendrites then pass their messages on to the central part of the neuron, called the *cell body* or **soma**, which acts as the command center for the neuron. In addition to housing the cell's chromosomes, the soma conducts on-the-spot evaluation of the hundreds (or sometimes thousands) of messages received by the cell, often simultaneously. Making the assessment even more complex, some of these messages received by the neuron are *excitatory* (saying, in effect, "Fire!") and some are *inhibitory* ("Don't fire!"). The "decision" made by the soma depends on its overall level of arousal—which depends, in turn, on the sum of the incoming messages.

When excitation triumphs over inhibition, the neuron initiates a message of its own and sends it along a single "transmitter" fiber known as the **axon**, which—to continue with our tree metaphor—looks like a tree trunk. And just as trees vary in height, these axons vary tremendously in length. In a college basketball player, axons connecting the spinal cord with the toes can be more than 3 feet long, while at the other extreme, axons of interneurons in the brain may span only a tiny fraction of an inch. When the message reaches the end of the axon, it may be passed along to another neuron—but before we give you the details of that process, let's examine what happens in the axon first.

THE ACTION POTENTIAL When arousal in the cell body reaches a critical level, it triggers an electrical impulse in the axon—like the electronic flash of a camera—and, as we said, the neuron "fires." What does that mean? Much like a battery, the axon gets electrical energy from charged chemicals called *ions.* In its normal, resting state—appropriately called the **resting potential**—the ions inside the axon have a negative electrical charge. But this negative state is easily upset. When the cell body becomes excited, it triggers a cascade of events, known as the **action potential**, which temporarily reverses the charge and causes the electrical signal to race along the axon (Figure 2.5), firing the neuron.

How does the electrical charge reverse itself from negative to positive?

During the action potential, tiny pores open in a small area of the axon's membrane adjacent to the soma, allowing a rapid influx of positive ions. Almost immediately, the internal charge in that part of the axon changes from negative to positive. (We're talking a thousandth of a second here.) Then, like a row of falling dominoes, these changes in the cell membrane progress down the axon. The result is an electrical signal that races from the soma toward the axon ending. There's no halfway about this action potential: Either the axon "fires" or it doesn't. Neuroscientists call this the **all-or-none principle**. Incidentally, when this process careens out of control, with very large numbers of neurons becoming hypersensitive and firing too easily, the result can be an epileptic seizure.

Then, almost immediately after firing, the cell's "ion pump" flushes out the positively charged ions and restores the neuron to its resting potential, ready to fire again. Incredibly, the whole complex cycle may take less than a hundredth of a second. It is an amazing performance! Once complete, the message carried by the action potential is ready for possible transfer to another neuron. Let's survey that process next.

SYNAPTIC TRANSMISSION So, what happens when the electrical impulse reaches the end of the axon—does it automatically get passed along to another neuron?

Figure 2.5 Structure and Function of the Neuron

Dendrites   Nucleus

Myelin sheath

Soma

Cytoplasm
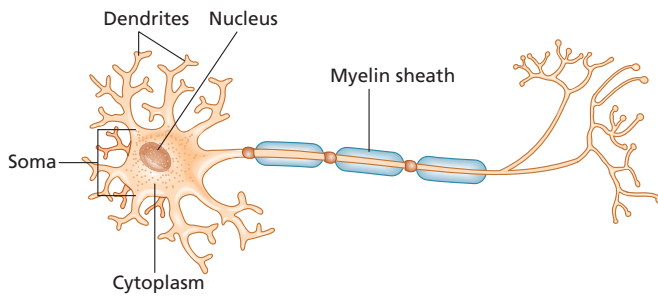
A typical neuron receives thousands of messages simultaneously through its **dendrites** and **soma** (cell body).

Soma

Terminal buttons

Axon   Myelin sheath
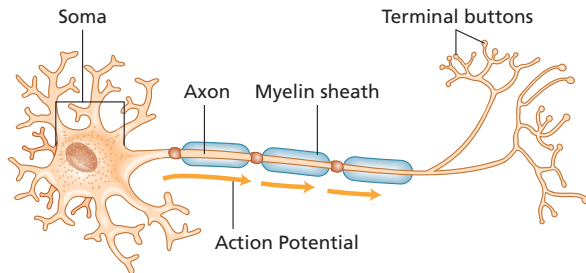
Action Potential

When the soma becomes sufficiently aroused, its own message is then passed to the **axon**, which transmits by means of an **action potential** to the cell's **terminal buttons**.

Myelin sheath

K⁺ K⁺ K⁺   Na⁺ Na⁺ Na⁺
Na⁺ Na⁺ Na⁺   K⁺ K⁺ K⁺
K⁺ K⁺ K⁺   Na⁺ Na⁺ Na⁺

Action Potential
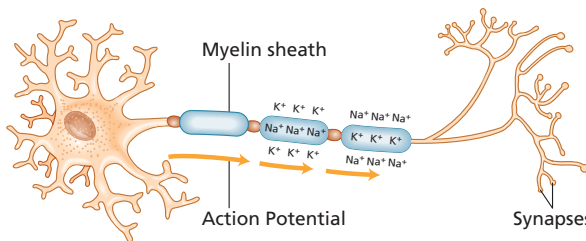
Synapses

There, tiny vesicles containing **neurotransmitters** rupture and release their contents into the **synapse** (synaptic cleft).

Neurotransmitter molecule

Axon

Action potential (neural impulse)

Vesicles

Presynaptic membrane

Synaptic cleft

Postsynaptic membrane

Some neurotransmitters do not "fit the lock"

Some neurotransmitters "fit the lock"

Receptor sites

Dendrite
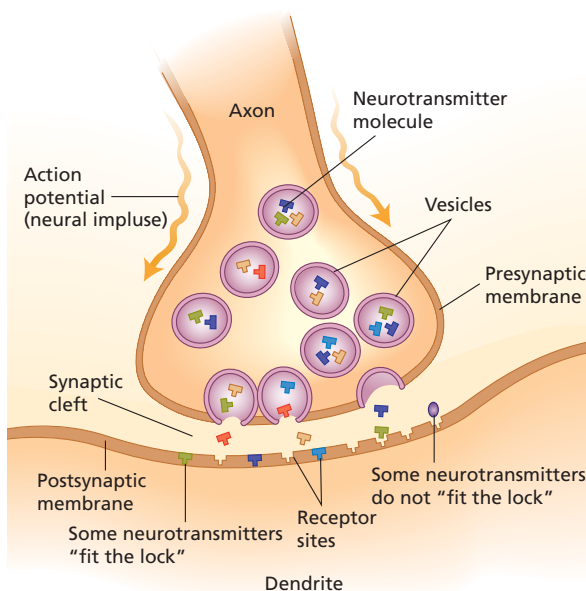
Appropriately shaped transmitter molecules arriving at the postsynaptic membrane can dock at receptors, where they stimulate the receiving cell. Excess neurotransmitters are pulled back into the "sending" neuron by means of reuptake.

No—unfortunately, it has one more challenge to overcome! Here's why: Despite their close proximity to each other, nerve cells do not actually touch each other. A microscopic gap, called a **synapse**, lies between them, acting as an electrical insulator (see Figure 2.5). This *synaptic gap* (or *synaptic cleft*) prevents the charge from jumping directly from the axon to the dendrite of the next cell in the circuit (Dermietzel, 2006). Instead, it must transform itself from electrical message into chemical message, so it can cross the gap. And this is where a substance you've probably heard of, known as neurotransmitters, comes into play.

NEUROTRANSMITTERS When the electrical impulse arrives at the end (or, terminal branch) of the axon, tiny bubble-like vesicles (sacs) inside the **terminal buttons** burst and release their chemical contents, known as **neurotransmitters**, into the synapse. These neurotransmitters then attempt to ferry the neural message across the gap to the next neuron in the chain (again, see Figure 2.5).

What do we mean by "attempt"?

This is where the process gets a bit more complicated—partly because there are dozens of different neurotransmitters, each of which has a different chemical structure, and partly because each ruptured vesicle releases about 5,000 neurotransmitter molecules into the synapse (Kandel & Squire, 2000)! So, in order for the neural message to be passed along, there must be a receptor site on a nearby neuron that is an exact match to the shape of one of the neurotransmitters. (Remember learning in your basic science class what different molecules look like?) When there is a match, the neurotransmitter fits into the receptor site, much as a key fits into a lock. This lock-and-key process then stimulates the receiving neuron, which passes the message onward. Take a look at Figure 2.4 to review these structures involved in neural communication.

What happens to neurotransmitters that don't find a matching receptor site?

Through a process called **reuptake**, many of them are drawn back into vesicles. Others are broken down by specially matched enzymes, rather like a chemical cleanser that removes unwanted substances from your clothing or carpet. Learning about these dual processes has proven useful in research aimed at developing treatments for a variety of disorders.

For example, certain drugs—such as the well-known Prozac and its numerous chemical cousins—interfere with the reuptake process for a neurotransmitter called serotonin, which you may have heard is related to depression. By inhibiting the reuptake process for serotonin, the chemical remains available in the synapse longer, which

Table 2.1 Seven Important Neurotransmitters

Neurotransmitter	Normal Function	Problems Associated with Imbalance	Substances That Affect the Action of This Neurotransmitter
Dopamine	Associated with the brain's reward circuits, playing a key role in motivating reward-based behavior and sensations of pleasure. Also used by central nervous system (CNS) neurons involved in voluntary movement	Schizophrenia Parkinson's disease	Cocaine Amphetamine Methylphenidate (Ritalin) Alcohol
Serotonin	Regulates multiple motives and emotions: sleep and dreaming, mood, pain, aggression, appetite, and sexual behavior	Depression Certain anxiety disorders Obsessive–compulsive disorder	Fluoxetine (Prozac) Hallucinogenics (e.g., LSD)
Norepinephrine	Plays a key role in responding to stress and the "fight or flight" reaction	High blood pressure Depression	Tricyclic antidepressants Beta-blockers
Acetylcholine	The primary neurotransmitter used by efferent neurons carrying messages from the CNS Also involved in some kinds of learning and memory	Certain muscular disorders Alzheimer's disease	Nicotine Black widow spider venom Botulism toxin Curare Atropine Barbiturates
GABA	The primary *inhibitory* neurotransmitter in the CNS, important for calming fear and anxiety	Anxiety Epilepsy Insomnia	"Minor" tranquilizers (e.g., Valium, Librium) Alcohol
Glutamate	The primary *excitatory* neurotransmitter in the CNS; involved in learning and memory	Release of excessive glutamate apparently causes brain damage after stroke	PCP ("angel dust")
Endorphins	Play a key role in blocking pain, and also help control some emotions	Lowered levels resulting from opiate addiction	Opiates: opium, heroin, morphine, methadone

increases the odds it will be picked up by a matching receptor site and utilized. Other drugs, such as Aricept, used to treat Alzheimer's disease, interfere with the work of the cleanup enzyme for acetylcholine (another neurotransmitter), which has the same result as reuptake inhibitors: It ultimately leaves more of the chemical available for use (National Institute on Aging, 2010). Table 2.1 describes several neurotransmitters found especially relevant to psychological functioning.

2.4.3: Glial Cells: A Support Group for Neurons

Interwoven among the brain's vast network of neurons is an even greater number of glial cells, once thought to "glue" the neurons together. (In fact, the name comes from the Greek word for "glue.") Now, however, we know that **glial cells** provide structural support for neurons and also help form new synapses during learning (Fields, 2004; Gallo & Chittajallu, 2001). For example, glial cells form the **myelin sheath**, a fatty insulation covering many axons in the brain and spinal cord. Like the casing on an electrical cable, the myelin sheath on a neuron insulates and protects the cell. It also helps

speed the conduction of impulses along the axon (refer to Figure 2.5). Certain diseases, such as multiple sclerosis (MS), attack the myelin sheath, resulting in poor conduction of nerve impulses. That deficiency accounts for the variety of symptoms faced by persons with MS, ranging from difficulty with motor movement to sensory deficit to impairments in cognitive functioning (National Institutes of Health, 2010). The myelin sheath, incidentally, is part of what grows in the brain during learning, thus strengthening the neural connections. It is also what neurologists loosely refer to sometimes as "gray matter."

So there you have the two main building blocks of the nervous system: **neurons**, with their amazing plasticity, and the supportive glial cells, which protect the neurons and help propagate neural messages. But, wondrous as these individual components are, in the big picture of behavior and mental processes, a single cell doesn't do very much. It takes millions of neurons flashing their electrochemical signals in synchronized waves back and forth through the incredibly complex neural networks in your brain to produce thoughts, sensations, and feelings. Similarly, all your actions arise from waves of nerve impulses delivered to your muscles, glands,

and organs through the nervous system. It is to this larger picture—the nervous system—that we now turn our attention.

2.4.4: Neural Plasticity

One of the most extraordinary abilities of our brain is its ability to adapt or modify itself as the result of experience—a process called **plasticity** (Holloway, 2003; Kandel & Squire, 2000). When we learn something new, for example, dendrites can actually grow and form new synapses, creating new connections with different neurons. Over time, repeated stimulation of neural connections creates stronger and denser neural pathways. As neurologists put it, "Neurons that fire together, wire together."

So, when we frequently engage in a particular activity—be it playing a guitar, playing soccer, or playing a video game—our brain strengthens its neural connections involved in those tasks, thus helping us improve those abilities, as those brain regions are actually growing (Wang and others, 2011). As a violin player gains expertise, for example, the motor area of the brain linked to the fingers of the left hand becomes larger (Juliano, 1998). Likewise, the brain dedicates more neural real estate to the index finger used by a blind Braille reader (Elbert and others, 1995; LeDoux, 1996). As a result of plasticity, we now know that many abilities once thought to decline as a natural part of aging—such as learning new skills and information, physical agility, and even vision—can be maintained by more frequent use, which in turn keeps those neural networks strong (Chapman and others, 2015; DeLoss and others, 2015). Our actions and experiences, then, literally influence our physical brain development.

PLASTICITY AND PTSD   **Posttraumatic stress disorder (PTSD)** offers an important demonstration of how our experiences impact our brain via plasticity, enabling traumatic experiences to alter the brain's emotional responsiveness (Arnsten, 1998). Neural pathways of combat soldiers, for example, or people who have been violently assaulted can "rewire" to become more sensitive to cues that could, in a similar situation, help protect them from harm. Under normal circumstances, this neural re-wiring is generally adaptive, helping us become better able to survive in a particular environment. In the case of PTSD, however, the hair-trigger responsiveness that could be lifesaving in a dangerous situation can, in non-threatening circumstances, prompt overreaction to mild, everyday stressors—or even to simple unexpected surprises. This, in fact, is one of the symptoms of PTSD. Fortunately, increased attention is prompting research into newer, more effective treatment

options that can help people recover from the disorder. Early intervention and treatment are important, though: The longer the symptoms go untreated, the stronger the neural connections associated with the symptoms become, and the longer it takes to return the brain to a normal state.

YOUR BRAIN ON PORN   Any frequent experience can affect our brain's pathways via plasticity. Recently, scientists have begun to investigate how many of our media experiences alter our brains, and few of those inquiries are more controversial than the examination into the effects of excessive use of porn on our brains. Thanks to modern technology, we have easy access to pornography on our phones and devices anytime. And while occasional use of porn may benefit couples' sex lives and provide stimulation to singles, could there be drawbacks to frequent use?

As you may have noticed, once you click on one image or video online, more and more pop up, and before you know it, hours can pass. The same thing happens with video games, texting, and other technology opportunities that provide constant stimulation. What explains the addictive nature of these activities? In part, it's a neurotransmitter called **dopamine**—a natural pleasure chemical—that gets released in our brain when we anticipate a reward for something (Wise, 2004). The dopamine keeps us engaged, motivated, and working for the reward. So, every time we click on a new video, or approach a new level in a video game, our brain gets additional stimulation in the form of dopamine, spurring us on and repeating the reward cycle (Wise, 2008). And as we comply, those neural networks strengthen, simultaneously impoverishing other areas of the brain—notably including those specializing in impulse control and decision making (Prasad and others, 1999; Volkow and others, 2010).

How does this supercharged neural network for porn affect our real-life relationships?

Recent research using magnetic resonance imaging (MRI) brain scans showed less activity and gray matter in the brain's reward and motivation circuits among participants who watched 4 hours of porn per week (compared to non-viewers). Simone Kühn, lead investigator of that study, says that overstimulation from frequent porn viewing may wear out the brain's reward system (Kühn & Gallinat, 2014). Men in the study also showed less neural response to sexual images. These brain scans corroborate increasing reports from habitual porn viewers complaining that sex with their regular partners isn't enough anymore (Arkowitz & Lilienfeld, 2010; Doidge, 2007; Wilson, 2015). Difficulty obtaining or maintaining an erection with a living,

breathing partner is becoming an increasing problem, especially in young men, whose porn-habituated brains gain little stimulation from "regular" sex with physical partners.

This neural rewiring is impacting cultural expectations of sex as well, especially in teens and young adults. Psychologist Catherine Steiner-Adair interviewed more than 1,000 young men and women and discovered frequent reports of young men acting sexually aggressive toward young women, who didn't like the aggression and consequently spurned their advances (Steiner-Adair & Barker, 2014). According to Steiner-Adair, the boys are confused because their sex education is based on porn, so they don't understand why girls don't respond. Girls, for their part, when they do respond, often think there is something wrong with them if they don't like whatever the woman in the porn video seemed to enjoy. And the phenomenon isn't just affecting teens and twenty-somethings: Adults of all ages are increasingly finding that Internet porn bears less and less resemblance to real-life, intimate sexual activity—and when porn sets the expectations, the real-life relationship may suffer.

What's the solution?

The same brain plasticity that enabled what some call "the porn-driven re-wiring" in the first place can enable another re-wiring based on different experiences. Gary Wilson, author of *Your Brain on Porn* (2014), asserts that many men have overcome their erectile dysfunction and other porn-related sexual problems with something called "rebooting"—which generally requires a commitment to refraining from hardcore Internet porn and concurrent masturbation for a couple of months. After that time, men are able to enjoy sex again with their regular partners, and their sexual dysfunctions are resolved. Other studies of plasticity suggest that you can also help rewire your brain and change your expectations by watching more realistic sex: One activist launched a website for just that purpose, where people can upload their own "everyday" sex videos to share with others. Even some porn stars have contributed their personal home videos to the site. Making real-life sex videos available online offers an alternative to hardcore porn that, the owner hopes, will fulfill people's desires to watch sex in a way that doesn't cause harm to their brains or their relationships.

Plasticity, then, accounts for much of our human ability to adapt to our experiences—for better or for worse. By creating neural connections that are strongest for our most powerful and frequent experiences, we become better suited for those experiences (whether we wanted to be or not). Plasticity facilitates the brain's ability to compensate for injury, such as when Jill Bolte Taylor's massive stroke wiped out a significant portion of one side of her brain, taking with it her language abilities, mathematical reasoning, and analytical skills. With the help of her mother and a team of rehabilitation experts, she slowly relearned those skills—thanks to her brain's ability to create new connec-

tions to compensate for what was lost. In this way, plasticity enables the brain to continually be restructured and "reprogrammed," both in function and in physical structure, by experience (LeDoux, 2002).

WRITING PROMPT

The Effects of Plasticity on Your Brain

List one activity that you currently spend the most time doing and one that you ignore. Describe how your brain is being strengthened or limited by your level of attention to each.

▶ | The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

2.4.5: Brain Implants

Plasticity, of course, cannot compensate for injuries that are too extensive. Driven by this problem, neuroscientists are experimenting with computer chips implanted in the brain, hoping to restore some motor control in paralyzed patients. In one early case, a 26-year-old paralyzed male received such a chip as an implant in his motor cortex. By merely thinking about movement, he learned to send signals from his brain to a computer, controlling a cursor by thought, much as he might have used a computer's mouse by hand. In this cerebral way, he could play video games, draw circles, operate a TV set, and even move a robotic hand—all of which his paralysis would have made impossible without the implant (Dunn, 2006; Hochberg and others, 2006).

In the past few years, research using brain implants to control prosthetic limbs has expanded. In 2012, one patient received a motor cortex implant and by the second day was successfully using it to control movements of a prosthetic arm (Collinger and others, 2013). Eric Sorto, a patient who has been paralyzed from the neck down for more than 10 years, spoke longingly of missing the independence of the "little things," such as being able to sip a beer on his own, rather than having to ask someone to help him. Now, his brain implant enables him to use a robotic arm, controlled by his brain, to shake hands, to play the classic game "rock, paper, scissors," and even to move the arm smoothly and gracefully enough to enable sipping a drink at will (Thomson, 2015).

2.5: The Nervous System

Objective: Distinguish between the central nervous system and the peripheral nervous system

If you could observe a neural message as it moves from stimulus to response, you would see it flow seamlessly

from one part of the nervous system to another. The signal might begin, for example, in the eyes, then travel to the brain for extensive processing, and finally reemerge from the brain as a message instructing the muscles to respond. In fact, the **nervous system**, consisting of all the neurons in the body, functions as a single, complex, and interconnected unit. Nevertheless, we find it convenient to distinguish among divisions of the nervous system based on their location and the type of processing they do. The most basic distinction recognizes two major divisions: the central nervous system and the peripheral nervous system (Figure 2.6).

2.5.1: The Central Nervous System

Composed of the brain and spinal cord, the **central nervous system** (CNS) serves as the body's "command central." The brain, filling roughly a third of the skull, makes complex decisions, coordinates our body functions, and initiates most of our behaviors. The spinal cord, playing a supportive role, serves as a sort of neural cable, connecting the brain with parts of the peripheral sensory and motor systems.

REFLEXES The spinal cord has another job as well. It takes charge of simple, swift **reflexes**—responses that do not require brain power, such as the reflex your physician elicits with a tap on the knee. We know that the brain is not involved in these simple reflexes, because a person whose spinal cord has been severed doesn't sense the pain—but may still be able to withdraw a limb reflexively from a painful stimulus. Voluntary movements, however, do require the brain. That's why damage to nerves in the spinal cord can produce paralysis of the limbs or trunk. The extent of paralysis depends on the location of the damage: The higher the site of damage, the greater the extent of the paralysis.

CONTRALATERAL PATHWAYS Significantly, most sensory and motor pathways carrying messages between the brain and the rest of the body are **contralateral**—that is, they cross over to the opposite side in the spinal cord or the brain stem. The result—and this is important—is that each side of the brain communicates primarily with the opposite side of the body or the environment. This fact is essential in understanding how damage to one side of the brain often results in disabilities on the opposite side of the body. Jill Bolte Taylor's stroke, for example, was in the left side of her brain, but it was her right arm that became paralyzed during the event.

2.5.2: The Peripheral Nervous System

Also playing a supportive role, the **peripheral nervous system** (PNS) connects the CNS with the rest of the body through bundles of sensory and motor axons called *nerves.* The many branches of the PNS carry messages between the brain and the sense organs, the internal organs, and the muscles. In this role, the PNS carries incoming messages telling your brain about the sights, sounds, tastes, smells, and textures of the world. Likewise, it carries outgoing signals telling your body's muscles and glands how to respond.

Figure 2.6 Organization of the Nervous System

This figure shows the major divisions of the nervous system. The figure on the left shows the central nervous system; the figure on the right shows the peripheral nervous system.
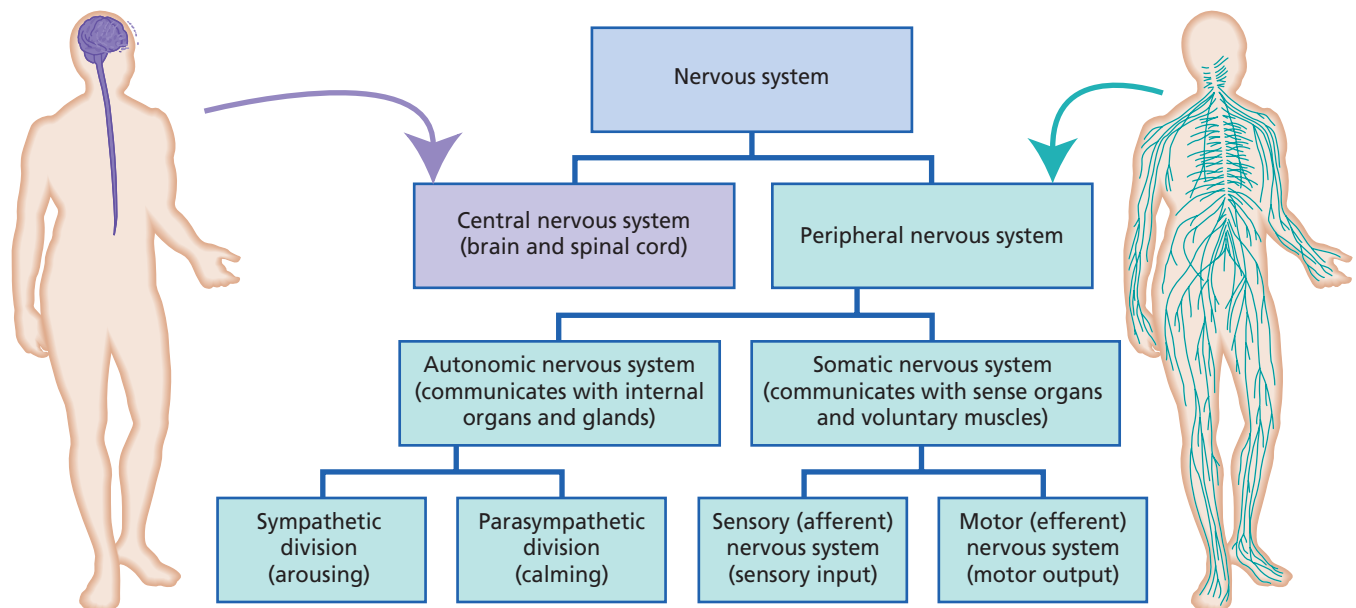
You might think of the PNS as a pickup-and-delivery service for the CNS. If, for example, an aggressive dog approaches you, your PNS picks up the auditory information (barking, growling, snarling) and visual information (bared teeth, hair standing up on the neck) for delivery to the brain via the **sensory neurons**. Quickly, perceptual and emotional circuits in the brain assess the situation (Danger!) and communicate with other circuits, dispatching orders for a hasty retreat. The PNS then delivers those orders via **motor neurons** to mobilize your heart, lungs, legs, and other body parts needed to respond to the emergency. It does this through its two major divisions, the somatic nervous system and the autonomic nervous system. One deals primarily with our external world, the other with our internal responses. (Taking some time to study Figure 2.6 will help you understand these divisions and subdivisions.)

THE SOMATIC DIVISION OF THE PNS   Think of the **somatic nervous system** as the brain's communications link with the outside world. Its *sensory* component connects the sense organs to the brain, and its *motor* component links the CNS with the skeletal muscles that control voluntary movements. So, for example, when you see a slice of pizza, the visual image is carried to the brain by the somatic division's *afferent* (sensory) system. Then, if all goes well, the *efferent* (motor) system sends instructions to muscles that propel the pizza on just the right trajectory into your open mouth.

THE AUTONOMIC DIVISION OF THE PNS   The other major division of the PNS takes over once the pizza starts down your throat and into the province of the **autonomic nervous system** (*autonomic* means self-regulating or independent). This network carries signals that regulate our internal organs as they perform such jobs as digestion, respiration, heart rate, and arousal. And it does so unconsciously—without our having to think about it. The autonomic nervous system also works when you are asleep. Even during anesthesia, autonomic activity sustains our most basic vital functions.

And—wouldn't you know?—biopsychologists further divide the autonomic nervous system into two subparts: the sympathetic and parasympathetic divisions (as shown in Figure 2.7).

Figure 2.7 Divisions of the Autonomic Nervous System

The *sympathetic nervous system* (at left) regulates internal processes and behavior in stressful situations. The *parasympathetic nervous system* (at right) regulates day-to-day internal processes and behavior, and also helps return the body to normal functioning after a stressful situation.

SYMPATHETIC

Dilates pupil
Stimulates tear glands
Inhibits salivation
Increases sweating
Accelerates heart
Dilates bronchi
Decreases digestive functions of stomach
Secretes adrenalin
Decreases digestive functions of intestine
Inhibits bladder constriction

Chain of sympathetic ganglia
Spinal cord

PARASYMPATHETIC

Constricts pupil
Inhibits tear glands
Increases salivation
Slows heart
Constricts bronchi
Increases digestive functions of stomach
Increases digestive functions of intestine
Contracts bladder

The **sympathetic division** arouses the heart, lungs, and other organs in stressful or emergency situations, when our responses must be quick and powerfully energized. Often called the "fight-or-flight" system, the sympathetic division carries messages that help us respond quickly to a threat by either attacking or fleeing. The sympathetic system also creates the tension and arousal you feel during an exciting movie or first date. Perhaps you can recall how the sympathetic division of your autonomic nervous system made you feel during your last oral presentation. Was it hard to breathe? Were your palms sweaty? Did your stomach feel queasy? All these are sympathetic division functions.

The **parasympathetic division** does just the opposite: It applies the neural brakes, returning the body to a calm and collected state after emotional arousal. But even though it has an opposing action, the parasympathetic division works cooperatively with the sympathetic system, like two children on a teeter-totter.

Now, having completed our whirlwind tour of the nervous system, we return our attention briefly to its partner in internal communication, the endocrine system.

2.6: The Endocrine System

Objective: **Examine how hormones serve as the communication channel among the glands of the endocrine system**

Perhaps you never thought of the bloodstream as a carrier of information, along with oxygen, nutrients, and wastes. Yet blood-borne information, in the form of **hormones**, serves as the communication channel among the glands of the **endocrine system**, shown in Figure 2.8. (*Endocrine* comes from the Greek *endo* for "within" and *krinein* for "secrete.")

Playing much the same role as neurotransmitters in the nervous system, hormones carry messages that influence not only body functions but also behaviors and emotions (Damasio, 2003; LeDoux, 2002). For example, hormones from the adrenals produce the arousal accompanying fear. Hormones from the pituitary stimulate growth. Hormones from the ovaries and testes influence sexual development and sexual responses. And hormones from the thyroid control metabolism (rate of energy use). Once secreted into the blood by an endocrine gland, hormones circulate throughout the body until delivered to their targets, which may include not only other endocrine glands but also muscles and organs. Table 2.2 outlines the major endocrine glands and the body systems they regulate.

2.6.1: How Does the Endocrine System Respond in a Crisis?

Under normal (unaroused) conditions, the endocrine system works in parallel with the parasympathetic nervous

Figure 2.8 Endocrine Glands

The pituitary gland is the "master gland" regulating the endocrine glands, whose locations are shown here. The pituitary gland is itself under control of the hypothalamus, an important brain structure that regulates many basic functions of the body.
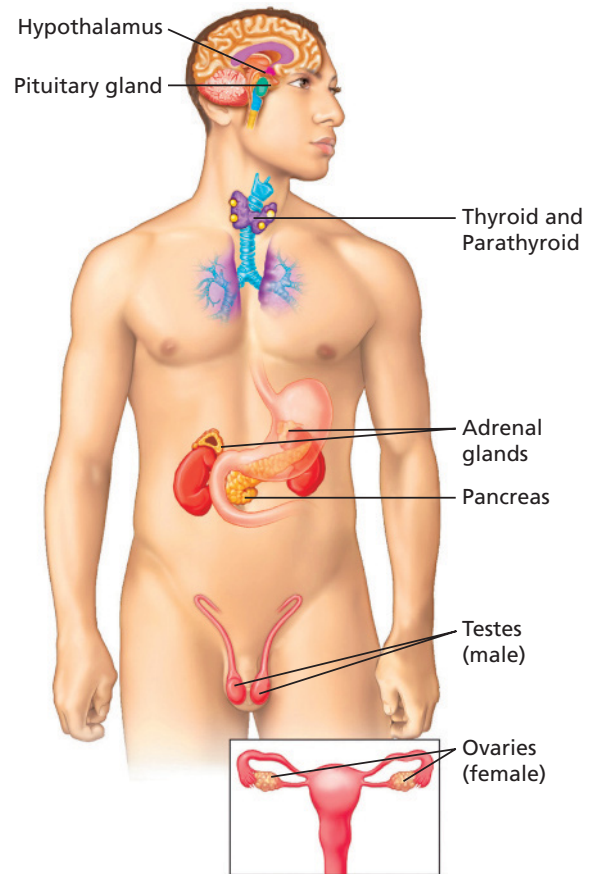
Table 2.2 Hormonal Functions of Major Endocrine Glands

These Endocrine Glands . . .	Produce Hormones That Regulate. . .
Anterior pituitary	Ovaries and testes Breast milk production Metabolism Reactions to stress
Posterior pituitary	Conservation of water in the body Breast milk secretion Uterine contractions
Thyroid	Metabolism Physical growth and development
Parathyroid	Calcium levels in the body
Pancreas	Glucose (sugar) metabolism
Adrenal glands	Fight-or-flight response Metabolism Sexual desire (especially in women)
Ovaries	Development of female sexual characteristics Production of ova (eggs)
Testes	Development of male sexual characteristics Sperm production Sexual desire (in men)

system to sustain our basic body processes. But in a crisis, it shifts into a different mode, in support of the sympathetic nervous system. So, when you encounter a stressor or an emergency (such as the speeding car headed toward you), the hormone *epinephrine* (sometimes called *adrenaline*) is released into the bloodstream, sustaining the body's "fight or flight" reaction. In this way, the endocrine system finishes what your sympathetic nervous system started—by keeping your heart pounding and your muscles tense, ready for action. This system, which is beneficial in an emergency situation, can go awry when the emergency continues for too long. For example, people who have stressful jobs or unhappy relationships may develop a chronically elevated level of stress hormones in their blood, keeping them in a prolonged state of arousal. The price your mind and body pay for this extended arousal can be high.

2.6.2: What Controls the Endocrine System?

At the base of your brain, a "master gland," called the **pituitary gland**, oversees all these endocrine responses. It does so by sending out hormone signals of its own through the blood to other endocrine glands throughout the body. But the pituitary itself is really only a midlevel manager. It takes orders, in turn, from the brain—in particular from a small region to which it is attached: the hypothalamus, a brain component about which we will have more to say in a moment.

For now, we want to emphasize the notion that the PNS and the endocrine system provide parallel means of communication, coordinated by their link in the brain. Ultimately, the brain decides which messages will be sent through both networks. We will next turn our attention to the master "nerve center" that makes these decisions—the brain—right after exploring how the concepts we just covered can explain the effects of psychoactive drugs.

Psychology Matters

How Psychoactive Drugs Affect the Nervous System

The mind-altering effects of marijuana, LSD, cocaine, methamphetamines, and sedatives attract millions of users. Millions more jolt their brains awake with the caffeine of their morning coffee, tea, or energy drink and the nicotine in an accompanying cigarette; at night they may attempt to reverse their arousal with the depressant effects of alcohol and sleeping pills. How do these seductive substances achieve their effects? The answer involves the ability of *psychoactive drugs* to enhance or inhibit natural chemical processes in our brains.

Agonists, Antagonists, and Reuptake Inhibitors

The ecstasy and the agony of psychoactive drugs come mainly from their interactions with neurotransmitters. Some impersonate neurotransmitters by mimicking their effects in the brain. Other drugs act less directly by enhancing or dampening the effects of neurotransmitters. And still others block the **reuptake** process, thus keeping the neurotransmitter available for use a little longer. Let's examine how these processes work.

WATCH Your Brain on Drugs
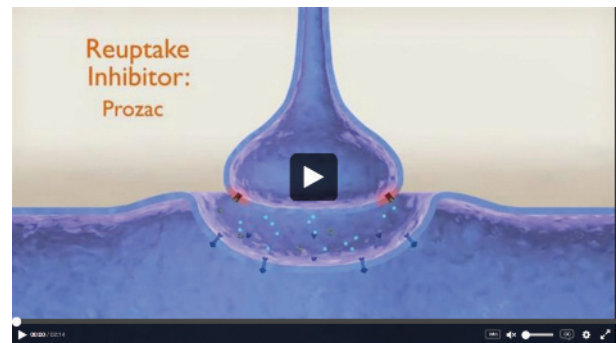
The effects of psychoactive drugs on our thoughts, feelings, and behaviors are due to the way the drugs interact with neurotransmitters in our brain. This video shows the three ways those interactions occur.

Why Side Effects?

Now that you understand how drugs create their effects in your brain, you may be wondering what causes their unwanted side effects. The answer to that question involves an important principle about the brain's design. As you might expect from our earlier look at brain action, the brain contains many bundles of neurons—**neural pathways**—that interconnect its components, much as rail lines connect major cities. Moreover, each pathway employs only certain neurotransmitters—like rail lines allowing only certain companies to use their tracks. This fact allows a drug affecting a particular transmitter to target specific parts of the brain. But here's the catch: Just as a particular railroad company may travel to many different cities, the same neurotransmitter may connect with a variety of different brain structures. For example, the brain's multiple serotonin pathways connect with brain structures that affect not only mood, but also sleep, appetite, and cognition. Because of these multiple serotonin pathways, taking Prozac (or one of its chemical cousins with other brand names) may treat depression but, at the same time, affect sleep patterns, appetite, and thinking. To date, no psychoactive drug exists that acts like a "magic bullet," striking only one precise target in the brain without causing collateral effects.

Key Question: How Does the Brain Produce Behavior and Mental Processes?

Core Concept 2.3

The brain is composed of any specialized modules that work together to create mind and behavior.

In September, 1848, a 25-year-old American railroad worker named Phineas Gage sustained a serious head injury when a charge of blasting powder drove an iron rod into his face, up through the front of his brain, and out through the top of his head. (See accompanying photo.)
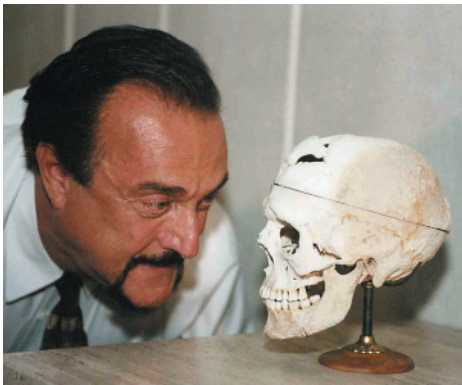
Author Phil Zimbardo with the skull of Phineas Gage.

Amazingly, Gage recovered from this injury and lived another 12 years—but as a psychologically changed man (Fleischman, 2002; Macmillan, 2000). Those who knew him noted that Gage, once a dependable and likeable crew boss, had become an irresponsible and rowdy ruffian. "Gage was no longer Gage," remarked his former companions (Damasio, 1994, p. 8). We cannot help but wonder: Had the site of his injury—the front of his brain—been the home of Phineas Gage's "old self"? Further, the story of Gage's transformation sounds rather similar to Jill Bolte Taylor's assertion that, since her stroke, she is "a different person." What could explain these changes?

These stories also raise a larger question: What is the connection between mind and body? Humans have, of course, long thought the two were linked—although they didn't always know the brain to be the organ of the mind. Even today we might speak, as they did in Shakespeare's time, of "giving one's heart" to another or "not having the stomach" for something when describing revulsion—even though we now know that love doesn't really flow from the heart, nor disgust from the digestive system, but that all emotions, desires, and thoughts originate in the brain. (Apparently, this news hasn't reached songwriters, who have yet to pen a lyric proclaiming, "I love you with all of my brain.")

At last, neuroscientists have begun unraveling the deep mysteries of this complex organ of the mind. We now see the brain as a collection of distinct modules that work together like the components of a computer. This new understanding of the brain becomes the core concept for this section.

The brain is composed of many specialized modules that work together to create mind and behavior.

As you study the brain, you will find that each of its modular components has its own responsibilities (Cohen & Tong, 2001). Some process sensations, such as vision and hearing. Some regulate our emotional lives. Some contribute to memory. Some generate speech and other behaviors. What's the point? The specialized parts of the brain act like members of a championship team: each doing a particular job yet working smoothly together. Happily, many of these modules perform their tasks automatically and without conscious direction—as when you simultaneously walk, digest your breakfast, breathe, and carry on a conversation. But, when something goes awry with one or more of the brain's components, as it does in a stroke or as happened to Phineas Gage, the biological basis of thought or behavior comes to the fore.

Let's begin the story of the brain by exploring how neuroscientists go about opening the windows on its inner workings.

By the end of this section, you will be able to:

2.7 Compare scanning techniques used to examine the brain.

2.8 Explain the roles of the brainstem, the limbic system, and the cerebrum.

2.9 Distinguish the unique functions of each lobe of the cerebral cortex.

2.10 Analyze the similarities and differences between the two hemispheres of the brain.

2.7: Windows on the Brain

Objective: Compare scanning techniques used to examine the brain.

Isolated within the protective skull, the brain can never actually touch velvet, taste chocolate, have sex, or see the blue of the sky. It only knows the outside world secondhand, through changing patterns of electrochemical activity in the **peripheral nervous system**, the brain's link with the physical world. To communicate within the body, the brain must rely on the neural and endocrine pathways that

carry its messages to and from the muscles, organs, and glands throughout the body.

But what would you see if you could peer beneath the bony skull and behold the brain? Its wrinkled surface, rather like a giant walnut, tells us little about the brain's internal structure or function. For that, technology—such as EEG, electrical stimulation, and various types of brain scans—has opened new windows on the brain.

2.7.1: Sensing Brain Waves with the EEG

For nearly 100 years, neuroscientists have used the **electro-encephalograph (or EEG)** to record weak voltage patterns called brain waves, sensed by electrodes pasted on the scalp. Much as city lights indicate which parts of town are most "alive" at night, the EEG senses which parts of the brain are most active. The EEG can identify, for example, regions involved in moving the hand or processing a visual image. It can also reveal abnormal waves caused by brain malfunctions, such as *epilepsy* (a seizure disorder that arises from an electrical "storm" in the brain). You can see the sort of information provided by the EEG in the image below.
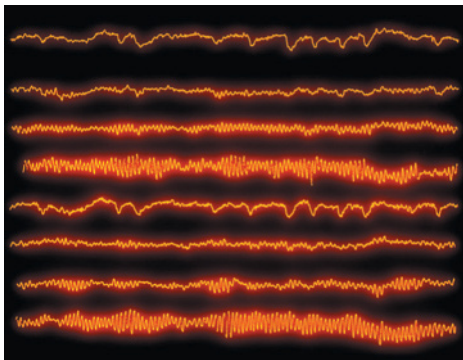
The EEG measures brain wave activity. It can be used to search for abnormal brain wave patterns that may indicate epilepsy, stroke or brain lesion, dementia, or sleep disorders.

Useful as it is, however, the EEG is not very precise, indiscriminately recording the brain's electrical activity in a large region near each electrode. Because there may be fewer than a dozen electrodes used, the EEG does not paint a detailed electrical picture of the brain. Rather, it produces a coarse, moment-to-moment summary of electrical activity in millions of neurons—making it all the more amazing that we can sometimes read the traces of mental processes in an EEG record.

2.7.2: Mapping the Brain with Electric Probes

The next step forward in understanding the brain came about half a century ago, when the great Canadian neurologist Wilder Penfield opened another window on the brain by "mapping" its pinkish-gray surface. During brain sur-

gery, using a pen-shaped electric probe, Penfield stimulated patients' exposed brains with a gentle electric current and recorded the responses. (His patients were kept awake, but under local anesthesia, so they felt no pain.)

This was not just an experiment born out of curiosity. As a surgeon, Penfield needed to identify the exact boundaries of diseased brain areas to avoid removing healthy tissue. In the process, he found the brain's surface had distinct regions with distinct functions—an exciting finding at the time, decades ago! Stimulating a certain spot might cause the left hand to move; another site might produce a sensation, such as a flash of light. Stimulating still other sites occasionally provoked a memory from childhood (Penfield, 1959; Penfield & Baldwin, 1952). Later, other scientists followed his lead and probed structures deeper in the brain. There they found that electrical stimulation could set off elaborate sequences of behavior or emotions. The overall conclusion from such work is unmistakable: Each region of the brain has its own specific functions.

2.7.3: Computerized Brain Scans

During the past few decades, increasingly detailed views of the brain have emerged through sophisticated procedures collectively known as *brain scans.* Some types of scans make images with X-rays, others use radioactive tracers, and still others use magnetic fields. As a result, scientists can now make vivid pictures of live, functioning brain structures without opening the skull.

In medicine, brain scans help neurosurgeons locate brain abnormalities such as tumors or stroke-related damage. And in psychology, images obtained from brain scans can reveal amazing new views of where our thoughts and feelings are processed. How? Depending on the scanning method used, specific regions of the brain may "light up" when, for example, a person reads, speaks, solves problems, or feels certain emotions (Raichle, 1994).

The most common brain-scanning methods currently employed are CT, PET, MRI, and fMRI (Figure 2.9).

2.7.4: Which Scanning Method Is Best?

Each type of brain scan has its particular strengths and weaknesses. CT scans, with their good-quality images and relatively low cost, are often the first scan used to assess a potential injury, especially with brain trauma. PET scans are now being used to help identify plaques—clusters of intertwined, "dead" cells that can be symptoms of Alzheimer's disease—in the brains of living people, which in turn increases the likelihood of early detection. fMRI can show which parts of the brain are active during a particu-

Figure 2.9 Common Brain-Scanning Methods

A variety of brain-scanning techniques can be used to measure and investigate brain activity. Each uses a specific type of technology, lending certain advantages unique to each method.
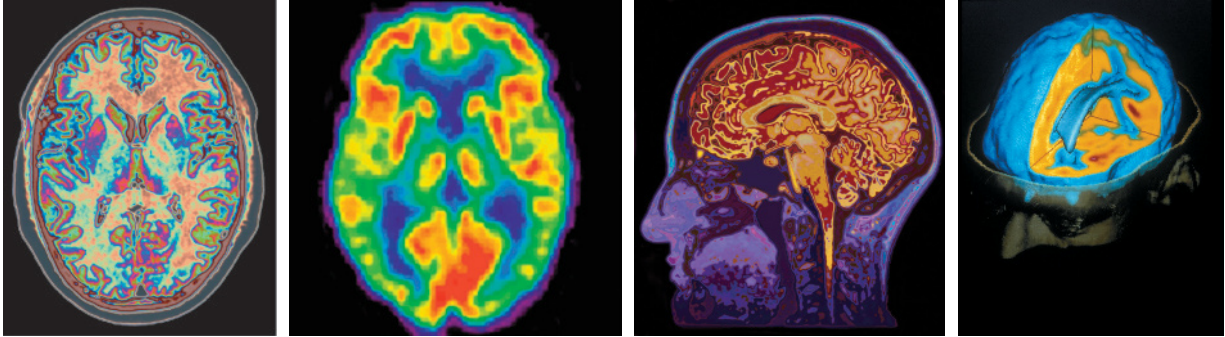
lar task, such as talking, looking at a picture, or solving a problem, and this approach has risen to prominence in research focused on mapping cognitive functions. Standard MRI, for its part, excels at distinguishing the fine details of brain structure and thus can help neurologists look for evidence of dysfunction. For one example of how MRI can help with diagnosis of learning disorders, take a look at this video.

It is important to note, however, that brain scans can't always provide a definitive diagnosis of physical or mental conditions. More often, they help rule out certain disorders, or provide evidence to help with diagnosis. So, it is best to think of them as one of the very useful tools in the toolbox of physicians and neuroscientists—necessary, but not sufficient.

Stay tuned for further developments as neuroimaging technology continues to improve.

2.8: Three Layers of the Brain

Objective: **Explain the roles of the brainstem, the limbic system, and the cerebrum.**

Certainly, all brains are not alike. But what distinguishes the brain of an elephant, say, from the brain of a honeybee or a human? And does size matter? Birds and reptiles manage to make a living with a brain that consists of little more than a stalk that regulates the most basic life processes and instinctual responses. Our own more complex brains arise from essentially the same stalk, called the **brain stem**. From an evolutionary perspective, then, this is the part of the brain with the longest ancestry and most basic functions. On top of that stalk, we and our mammalian cousins have evolved two more layers, known as the **limbic system** and the **cerebrum**, which greatly expand our brain powers (see Figure 2.10).

Figure 2.10 Major Structures of the Brain

From an evolutionary perspective, the brain stem and cerebellum represent the oldest parts of the brain; the limbic system evolved next; and the cerebral cortex is the most recent achievement in brain evolution.

Neocortex
(Higher-level Thought)

Limbic system
(Emotions)

Brain stem & cerebellum
(Survival instincts)
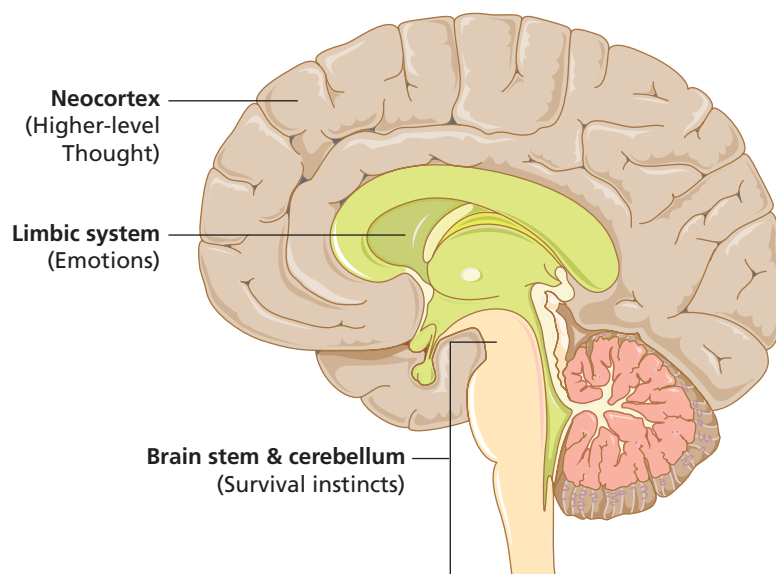
What basic role does each of these layers play in regulating our functioning, and what particular structures in each layer help with those tasks?

2.8.1: The Brain Stem and Its Neighbors

If you have ever fought to stay awake in a boring class (or after an all-nighter), you have struggled with your brain stem. Most of the time, however, it does its life-sustaining jobs less obviously and less obnoxiously. We can infer one of the brain stem's tasks from its location, linking the spinal cord with the rest of the brain. In this position, it serves as a conduit for nerve pathways carrying messages up and down the spinal corridor between the body and the brain. This is also where many sensory and motor pathways between the brain and our sense organs and skeletal muscles cross over to the opposite side (**contralateral pathways**), thus connecting each side of the brain to the opposite side of the body.

More than just a conduit, though, the brain stem also links together several important information-processing regions, three of which are contained in the brain stem itself (the medulla, the pons, and the reticular formation) and two that are adjacent (the thalamus and the cerebellum) (Pinel, 2005). From an evolutionary standpoint, all these are ancient structures found in the brains of creatures as diverse as penguins, pandas, pythons, porcupines, and people. You can see their specific locations in Figure 2.11.

Figure 2.11 The Brain Stem and Its Neural Neighbors

In this image you see the brain stem, with the reticular formation running vertically through it, and the medulla and pons in the middle and upper regions. The cerebellum is behind the brainstem, and the thalamus on top of it.
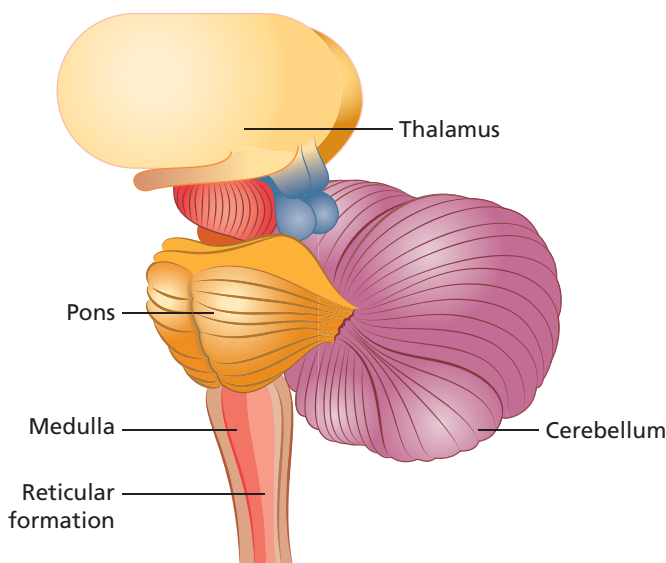
The **medulla**, appearing as a bulge in the brain stem, regulates basic body functions, which include breathing, blood pressure, and heart rate. It operates on "automatic pilot"—without conscious awareness—to keep our internal organs operating.

An even bigger bulge called the **pons** (meaning *bridge*) appears just above the medulla, where it houses nerve circuits that regulate the sleep and dreaming cycle. True to its name, the pons also acts as a "bridge" that connects the brain stem to the cerebellum, a structure involved in making coordinated movements.

The **reticular formation**, running through the center of the entire brain stem, is a pencil-shaped bundle of nerve cells that forms the brain stem's core. One of the reticular formation's jobs is keeping the brain awake and alert. Others include monitoring the incoming stream of sensory information and directing attention to novel or important messages. And—don't blame your professor—it is the reticular formation you struggle with when you become drowsy in class.

The **thalamus**, a pair of football-shaped bodies perched atop the brain stem, receives nerve fibers from the reticular formation. Technically part of the cerebral hemispheres, not the brain stem, the thalamus acts like the central processing chip in a computer, directing the brain's incoming and outgoing sensory and motor traffic. Accordingly, it receives information from all the senses (except smell) and distributes this information to appropriate processing circuits throughout the brain.

Last, but certainly not least, is the **cerebellum**, tucked under the back of the cerebral hemispheres and behind the brain stem, and looking very much like a mini-brain—in fact, its name comes from the Latin for "little brain." Accounting for about 10% of the volume of the brain, the cerebellum is densely packed with neurons—in fact, it contains about 50% of all the neurons in the entire brain! This rich neural network may help explain some of the startling discoveries researchers are beginning to make about the significance of the cerebellum in our functioning. Although it was long thought to be almost entirely dedicated to enabling our motor coordination and balance (Spencer and others, 2003; Wickelgren, 1998b), neurologists are now discovering the cerebellum's role in sensory, spatial, emotional and cognitive functioning as well. So, in addition to allowing you to ride a bicycle, hit a baseball, or run down a flight of stairs without being conscious of the precise movements of your feet, the cerebellum helps you read GPS scans, plan ahead, remember, and engage in skillful conversation (Schmahmann, 2010; Schmahmann & Caplan, 2006). It facilitates this wide variety of tasks—typically associated with other parts of the brain—via its extensive network of connections to the other regions.

The cerebellum is, essentially, the "fine-tuner" of all these activities, according to neurologist Jeremy Schmahmann, a leading researcher on the role of the cerebellum. We have long known that when the cerebellum doesn't function correctly, a person may be able to walk, but with movements that are disjointed, clumsy, and unbalanced.

Figure 2.12 Structures and Functions of the Brain Stem and Its Neural Neighbors

Review the brain structures you just studied and summarize their key functions.

Cerebral cortex:
(outer layer of cerebrum) involved in complex mental processes

Cerebrum:
the thick, outer layer of the brain, divided into two hemispheres

Limbic system:
regulates emotions and motivated behavior

Reticular formation:
controls alertness

Pons:
involved in regulation of sleep

Cerebellum:
regulates coordinated movement

Spinal cord:
pathway for neural fibers traveling to and from brain

Brain stem:
sets brain's general alertness level and warning system

Thalamus:
relays sensory information

Hypothalamus:
manages the body's internal state

Amygdala:
involved in emotion and memory

Pituitary gland:
regulates glands all over body

Hippocampus:
involved in memory

Medulla:
regulates autonomic body functions such as breathing and heart rate.

We are now learning that the cerebellum plays a similar role in our thoughts and emotions, helping our thoughts remain fluent and organized, our reactions timely, and our emotions appropriate for the social situation. Evidence for these connections comes from individuals with impairments to their cerebellum—including schizophrenic patients, who often experience deficits in these very functions. Thus, the cerebellum is now under scrutiny as a potential player in the puzzle of schizophrenia (Okugawa, 2013). This brain structure also helps us learn associations between environmental stimuli and reflexive behaviors—as when you learn to wince at the sight of a needle at the doctor's office (Hazeltine & Ivry, 2002; Thompson & Steinmetz, 2009).

Taken together, the brain stem and its neural neighbors control the most basic functions of movement and of life itself. Note, again, that much of their work is automatic, functioning largely outside our awareness. The next two layers, however, assert themselves more obviously in consciousness. See Figure 2.12.

2.8.2: The Limbic System: Emotions, Memories, and More

We're sorry to report that your pet canary or pretty goldfish doesn't have the emotional equipment that we mammals possess. You see, only mammals have a fully developed **limbic system**, a diverse collection of structures that wraps around the thalamus, atop the brain stem, deep inside the cerebral hemispheres (Figure 2.13).

Together, these ram's-horn-shaped structures give us greatly enhanced capacity for emotions and memory, faculties that offer the huge advantage of mental flexibility. Because we have limbic systems, we don't have to rely solely on instincts and reflexes that dominate the behavior of simpler creatures.

The limbic system houses other modules as well, regulating such important processes as hunger, thirst, and body temperature. Overall, the limbic system is the brain's command post for emotions, motives, memory, and maintenance

---

Figure 2.13 The Limbic System

The structures of the limbic system are involved with motivation, emotion, and certain memory processes.

Fear and apprehension:
Amygdala

Hunger and eating:
Hypothalamus

Learning and memory:
Hippocampus

---
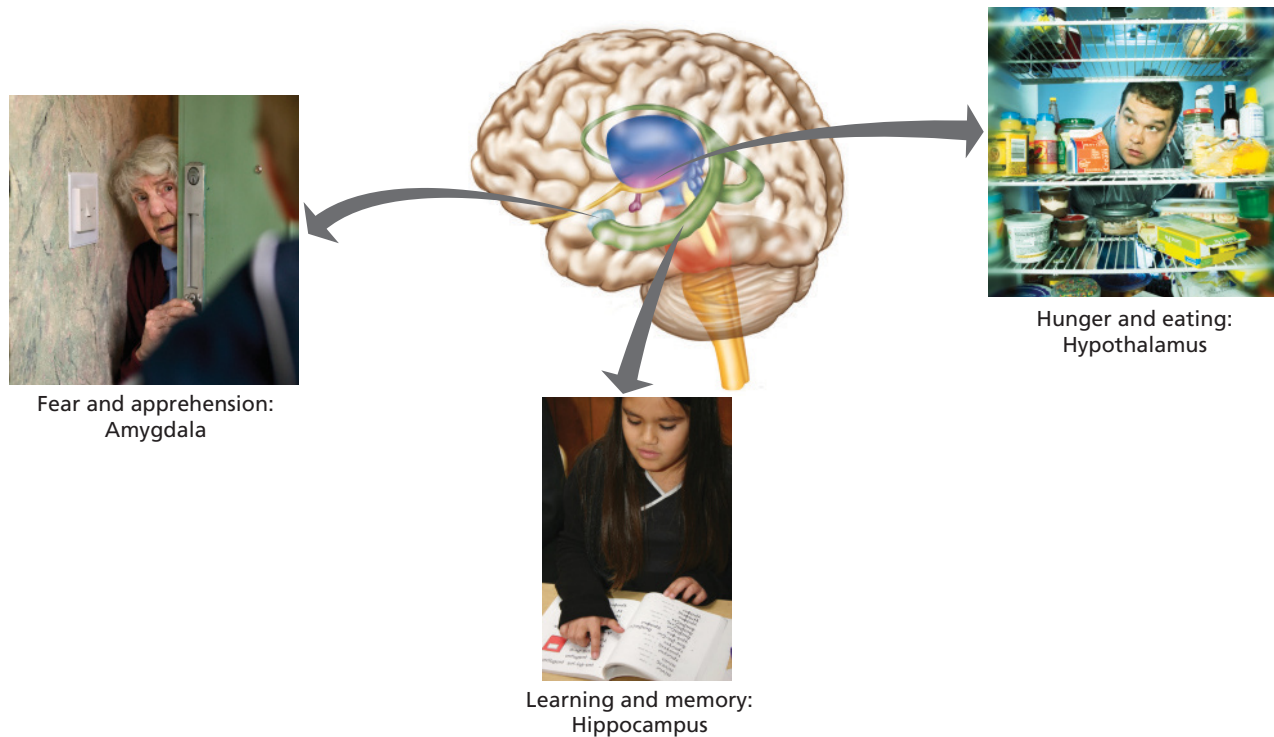
of a balanced condition within the body. Let's examine each of its modules and their corresponding functions in detail.

THE HIPPOCAMPUS AND MEMORY The **hippocampus** (named 500 years ago for its supposed resemblance to a seahorse) enables our memory system. Actually, the brain has one hippocampus on each side, giving us two *hippocampi* (see Figure 2.11). One of its jobs is to help us remember the location of objects, such as where you left your car in a large parking lot (Squire, 2007). And it appears to actually grow with experience, as suggested by a study of London cab drivers that found them to have larger hippocampi than people who didn't drive taxis, with more experienced cabbies having the largest hippocampi of all (Maguire and others, 2003).

In addition to its role in spatial memory, the hippocampus plays a key role in memory storage, as evidenced by the tragic story of Henry Molaison, better known as H. M. (referred to by his initials during his lifetime to protect his privacy). In 1953, when he was in his early 20s, H. M. underwent a radical and experimental brain operation intended to treat frequent seizures that threatened his life (Hilts, 1995). The surgery removed most of the hippocampus on both sides of his brain and succeeded in reducing the frequency of his seizures. Unfortunately, the surgery also produced an unforeseen and disastrous side effect: After the operation, new experiences disappeared from H. M.'s memory almost as soon as they occurred, although his memory for details of his life prior to the surgery remained intact. For the rest of his life, when he tried to remember

the years since 1953, H. M. drew a blank. He was even unable to recognize his daily caregivers. In fact, he continued to believe he was living in 1953 right up until his death in 2008. This story, along with corroborating research, indicates that—although the hippocampus is not the storage location for memory—it is critically involved in creating new memories as we experience life.

The Hippocampus
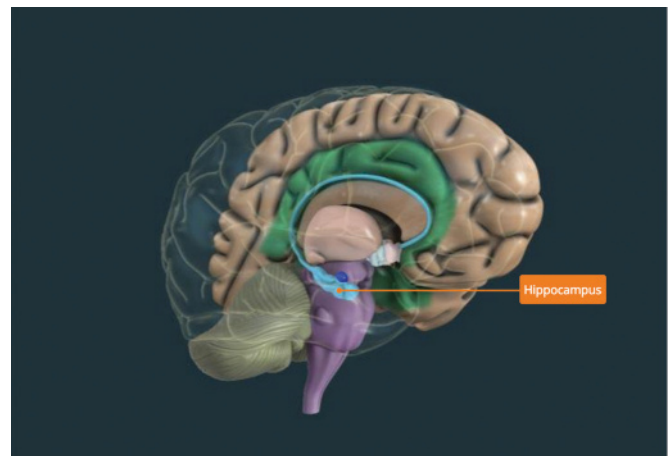
The hippocampi (we have two—one in each hemisphere) are essential for creating new memories and also play a key role in spatial memory.

THE AMYGDALA AND EMOTION Another limbic structure, the **amygdala**, also takes its name from its shape: *Amygdala* means "almond" in Greek. Like many other brain

structures, there are actually two amygdalae, one extending in front of the hippocampus on each side (see Figure 2.12).

In a classic experiment designed to find out what the amygdala does, Heinrich Klüver and Paul Bucy (1939) surgically snipped the connections to the amygdala on both sides of the brain in normally foul-tempered rhesus monkeys. Postsurgically, the beasts became so docile and easy to handle that even Klüver and Bucy were surprised. Their findings were the first to clearly demonstrate the amygdala's role in fear and aggression. This brain structure becomes especially active when we feel threatened, and it is a key factor in our responses to fear.

More recent studies have expanded our understanding of the amygdala. For example, it coordinates with the hippocampus, so that memories of previous experiences help calibrate our current emotional response (Roozendaal and others, 2009). As a result, a person previously injured in a car accident may overreact to a minor threat (such as brief tailgating) from another driver, thus helping explain some negative trigger reactions in posttraumatic stress disorder (PTSD). This tiny structure also activates in both men and women (although to a greater degree in men) when they view sexually arousing images (Hamann, 2005), illustrating its role in positive emotions as well as negative ones. And, the amygdala is one of several brain structures suspected to be at work in the **autism spectrum disorders**—for example, the amygdala tends to be enlarged in persons with autism (Baron-Cohen and others, 2000).

The Amygdala
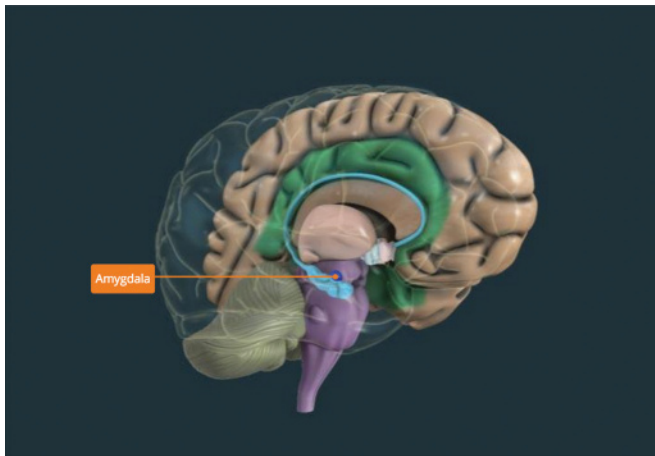
The amygdalae (as with most other brain structures, we actually have two of them—one in each hemisphere) play a key role in fear and other survival-oriented emotions. Conveniently located next to the hippocampus, the two structures coordinate, using memories to help calibrate emotional responses.

THE HYPOTHALAMUS AND CONTROL OVER MOTIVATION   In passing, we have already met the **hypothalamus** (*hypo* is the Greek for "under," so the name tells you its location—under the thalamus). It is the limbic structure responsible for maintaining the body in a stable, balanced

condition, partly by initiating endocrine system messages. (You might remember learning about this process, called homeostasis, in a health or biology class.) The hypothalamus is rich with blood vessels as well as neurons, and so one of its roles is to serve as your brain's blood-analysis laboratory. By constantly monitoring the blood, it detects small changes in body temperature, fluid levels, and nutrients. When it detects an imbalance (too much or too little water, for example), the hypothalamus immediately responds with orders aimed at restoring balance.

The hypothalamus also hosts some of the brain's so-called pleasure centers, or reward circuits which generate the positive emotions associated with gratifying the hunger, thirst, and sex drives, or by taking any addictive drug (Olds & Fobes, 1981; Pinel, 2005). Other activities stimulate these limbic pleasure circuits, too, including humor, exciting activities such as riding a roller coaster, and even eating rich chocolate (Small and others, 2001; Watson and others, 2007).

Dopamine is one of several neurotransmitters that play a key role in these pleasure circuits. Each time we engage in a pleasurable activity, dopamine is released, making us feel good, so that the next time we feel the craving (whether it be for food, sex, a drug, or something else), we are likely to act on it again so we can obtain the same "high." These reward centers evolved to help motivate us toward behaviors necessary for our survival. Drugs of abuse, though, stimulate the reward centers the same way our survival-oriented behaviors do—and what's more, they do it more effectively. Thus, drugs of abuse can hijack the reward circuitry in individuals with a genetic predisposition to addiction, influencing them to seek more of the drug while simultaneously ignoring competing biological needs (Volkow and others, 2010).

The hypothalamus makes its influence felt in other ways as well. Although much of its work occurs outside of consciousness, the hypothalamus sends neural messages to "higher" processing areas in the brain, making us aware of its needs (hunger, for example). It also controls our internal organs through its influence on the pituitary gland, attached to the underside of the hypothalamus at the base of the brain. Thus, the hypothalamus serves as the link between the nervous system and the endocrine system, through which it regulates emotional arousal and stress.

2.8.3: The Cerebral Cortex: The Brain's Thinking Cap

When you look at a whole human brain, you mostly see the bulging **cerebral hemispheres**—a little bigger than your two fists held together. You may also notice they are connected by a band of fibers, known as the **corpus callosum**, through which the two hemispheres communicate with each other. The nearly symmetrical hemispheres form a thick layer (known as the *cerebrum*) that accounts for two thirds of the

brain's total mass and most of the limbic system. And the thin outer layer of the cerebrum, called the **cerebral cortex**, is literally the brain's thinking cap: Its distinctive folded and wrinkled surface allows over 10 billion neurons to squeeze into a thickness of just a few millimeters. Flattened out, the cortical surface would cover an area roughly the size of an opened newspaper. But because of its convoluted surface, only about a third of the cortex is visible when the brain is exposed.
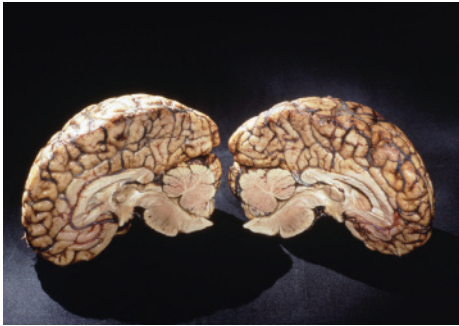
A healthy human brain, cut in half to expose the gyri (ridges) and sulci (furrows) of the brain's surface that create the folds enabling billions of cells to squeeze into a small area.

And what does this cerebral cortex do? It is the inner YOU! The locus of our most awesome mental powers, it processes all our sensations, stores memories, and makes decisions—among many other functions, which we will consider in our discussion of its lobes in the following section.

Although we humans take pride in our big brains, it turns out ours are not the biggest on the planet. All large animals have large brains—a fact more closely related to body size than to intelligence. Nor is the wrinkled cortex a distinctively human trait. Again, all large animals have highly convoluted cortexes. If this bothers your self-esteem, take comfort in the fact that we do have more massive cortexes for our body weight than do other big-brained creatures. Although no one is sure exactly how or why the brain became so large in our species (Buss, 2008; Pennisi, 2006), comparisons with other animals show that human uniqueness lies more in the way our brains function than in size. And for what it's worth, women's brains have more folding and wrinkling than do men's, while men's brains are, on average, slightly larger than women's (Luders and others, 2004).

2.9: Lobes of the Cerebral Cortex

Objective: **Distinguish the unique functions of each lobe of the cerebral cortex.**

In the late 1700s, the famous Austrian physician Franz Joseph Gall threw his considerable scientific weight behind the idea that specific regions of the brain control specific mental faculties, such as hearing, speech, movement, vision, and memory. Unfortunately, he carried this sensible idea to extremes: In his theory of *phrenology,* Gall claimed that the brain also had regions devoted to such traits as spirituality, hope, benevolence, friendship, destructiveness, and cautiousness. Moreover, he asserted that these traits could be detected as bumps on the skull, the "reading" of which became a minor scam industry. Thousands of people—including Harvard professors—flocked to lectures about phrenology in the 1830s, and many paid for personal skull readings that they used to help them make decisions about relationships, careers, and even job hiring decisions!

Gall's ideas captured the public's attention and became enormously popular, even though his theory was mostly wrong. He was absolutely right, however, on one important point: his doctrine of *localization of function*, the notion that *different parts of the brain perform different tasks*. Discoveries in modern neuroscience have confirmed that notion, and helped us revise Gall's flawed picture of the cerebral cortex. We now have a more accurate understanding of the primary purpose and function of the regions of the cortex (Figure 2.14).

Figure 2.14 The Phrenology Brain

Although phrenology was debunked, the general idea that different brain regions have different specialization turned out to be right.
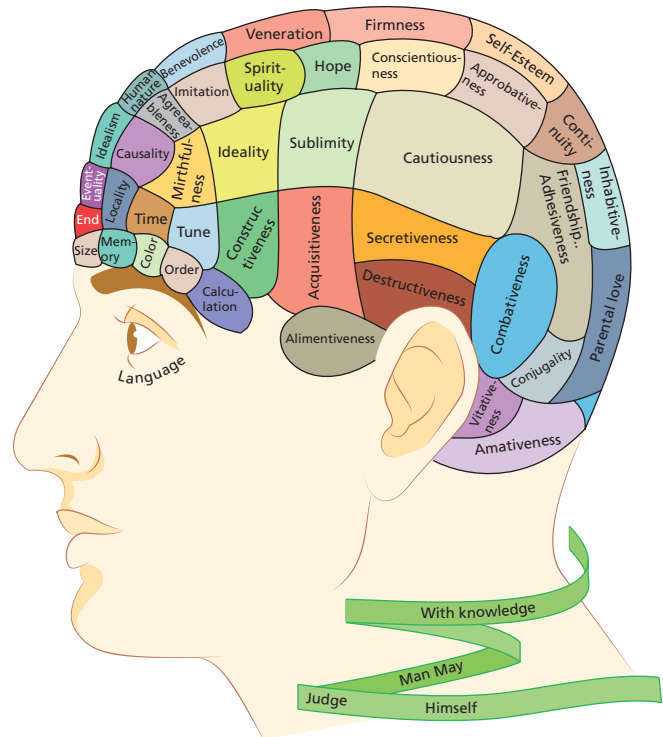
2.9.1: The Frontal Lobes

Your choice of major, your plans for the summer, and your ability to juggle your classes, your job, and your per-

sonal life all depend heavily on the cortical regions at the front of your brain, aptly named the **frontal lobes** (you have one in each hemisphere) (Figure 2.15).

Here, especially in the foremost region, known as the *prefrontal cortex,* we find circuitry for our most advanced mental functions, known as the executive functions, such as decision making, goal setting and follow-through, and anticipating future events (Miller, 2006a). The biological underpinnings of personality, temperament, and our sense of "self" seem to have important components here, too, as the case of Phineas Gage first suggested (Bower, 2006c). The prefrontal cortex, then, makes significant contributions to our unique abilities as humans.

At the back of the frontal lobe lies a special strip of cortex capable of turning our thoughts into actions. Known as the **motor cortex,** this patch of brain takes its name from its main function: controlling the body's motor movement by sending messages to motor nerves and on to voluntary muscles. As you can see in Figure 2.16, the motor cortex contains an upside-down map of the body, represented by the *homunculus* (the distorted "little man" in the figure).

Figure 2.15 The Four Lobes of the Cerebral Cortex

Motor cortex Generates signals responsible for voluntary movements

Primary somatosensory cortex Receives data about sensations in skin, muscles, and joints

Frontal Lobe

Prefrontal cortex Associated with various aspects of behavior and personality

Parietal Lobe

Visual association cortex Analyzes visual data to form images

Broca's area Vital for the formation of speech

Occipital Lobe

Primary visual cortex Receives nerve impulses from the visual thalamus

Primary auditory cortex Detects discrete qualities of sound, such as pitch and volume

Wernicke's area Interprets spoken and written language

Auditory association cortex Analyzes data about sound, so that we can recognize words or melodies

Temporal Lobe

Figure 2.16 The Motor Cortex and the Somatosensory Cortex

Frontal Lobe

Parietal lobe

leg shoulder wrist hand index finger thumb toes swallowing chewing

knee shoulder toes wrist hand fingers thumb face lips jaw
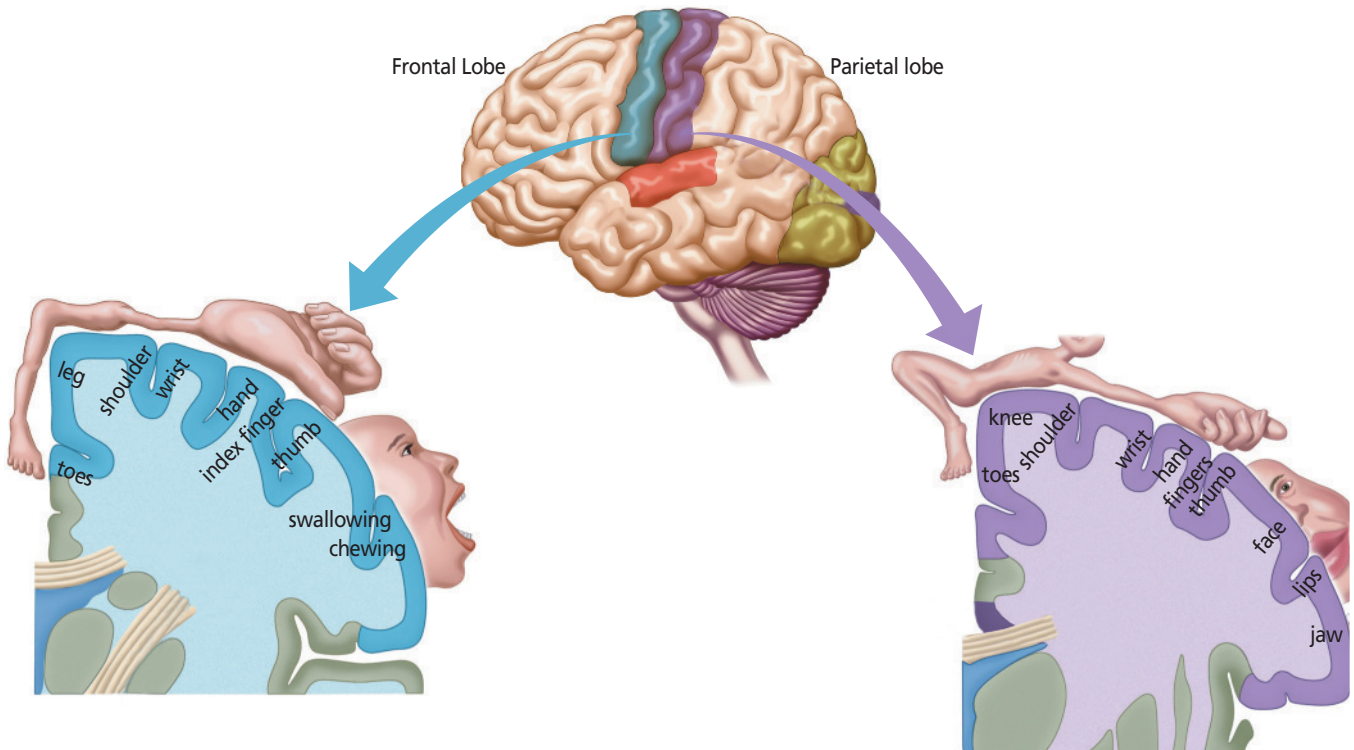
A closer look at the motor homunculus shows that it exaggerates certain parts of the body, indicating that the brain allots a larger portion of cortex to body parts requiring more fine-tuned motor control such as the lips, tongue, and hands. Perhaps the most exaggerated areas represent the fingers (especially the thumb), reflecting the importance of manipulating objects. Another large area connects to facial muscles, used in expressions of emotion. Remember the concept of **contralateral processing**, however. So a wink of your left eye originates in your right motor cortex, while the left motor cortex can wink your right eye.

THE LEFT FRONTAL LOBE'S ROLE IN SPEECH   In most people, the left frontal lobe has another important function: the production of speech (see Figure 2.13). This specialized region was first discovered in the mid-1800s by French neurologist Paul Broca. Damage to this region—aptly named *Broca's area*—can leave a person without the ability to talk. As you might have guessed, Jill Bolte Taylor's stroke damaged Broca's area in her brain, which explains why she lost her ability to speak. Surprisingly, though, the ability to *understand* speech lies elsewhere in the brain.

Broca's Area
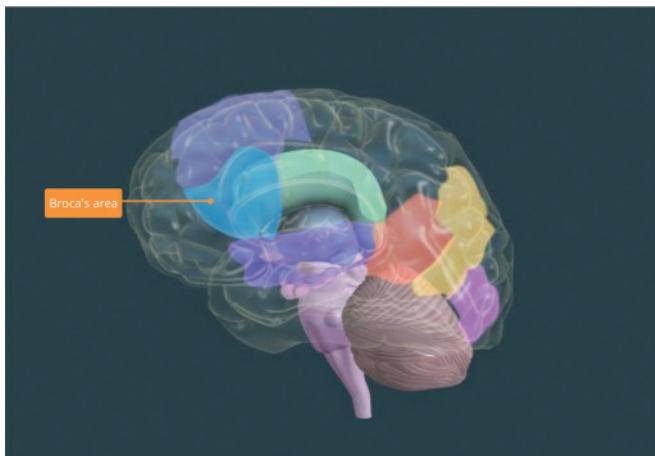
Broca's area, in the left front lobe, is crucial for producing language—regardless of whether it is spoken or signed (for example, with American sign language).

MIRROR NEURONS DISCOVERED IN THE FRONTAL LOBES   In the late 1990s, neuroscientists discovered what may be a new class of neurons, called **mirror neurons**, in the motor region of the brains of macaque monkeys. These mirror neurons fired when the monkeys observed another monkey performing a goal-directed behavior, such as taking an apple from a box or drinking from a cup—as if the observer monkey had performed the act himself. In effect, the observer monkey's brain was "mirroring" the action he had observed. Because primate brains are similar to human brains in many ways, this discovery led to a plethora of prognostication about the role of mirror neurons in humans. One leading scientist even predicted that mirror neurons would do for psychology what the discovery of DNA did for biology (Ramachandran, 2000)! But how much evidence do we have to support these notions?

Giacomo Rizzolatti, one of the discoverers of mirror neurons, believes that the firing of these specialized cells carries with it an understanding of others' intentions (Rizzolatti and others, 2006). So, for example, if you see a person smile and your mirror neurons fire, that could enable you to feel the normal feelings you associate with smiling, which in turn facilitates your communication with the other person and even promotes empathy. Rizzolatti and some of his colleagues have even taken that notion one step further, speculating that a malfunction in the mirror neuron system may underlie the social impairment typical in many autism spectrum disorders (Dapretto and others, 2006).

Critics, though, point out several problems in some of the more extreme claims of mirror neuron enthusiasts (Kilner & Lemon, 2013). One caution centers around the **correlation-causation fallacy**. Just because our own motor cortex, for example, activates when we see another person engaging in a motor activity, we cannot conclude that the neural firing caused our understanding of that behavior. Instead, it could be the other way around: Our recognition of the behavior (based on our memories of having done that behavior ourselves in the past) could be causing the neurons to fire (Hickok, 2009). Thus, it is premature to assume that the lack of imitation sometimes found in autism, for example, is *caused* by mirror neuron deficit or dysfunction. That assumption could also be dangerous if researchers ignore other promising lines of autism research in favor of this one (Hickok, 2014). Just because two things are correlated does not mean we can assume that one causes the other.

The second concern, perhaps even more important, is the notion that mirror neuron activity implies that the observer *understands the meaning and intent* of the action (rather than simply *recognizing* it). For example, if you see Mary grasp a cup, you might infer from the way she grasps it that she intends to drink from it (rather than, say, give it to someone else). Mirror neuron enthusiasts have assumed this type of action-understanding comes with the mirror neuron package, so to speak—in other words, that mirror neuron activity promotes deeper understanding of the person's motives and actions, leading to far-flung conclusions that mirror neurons underlie

empathy and social understanding. But research outside the area of mirror neurons clearly shows that understanding others' motivations can occur outside a mirror neuron system, in part as the result of analytical thinking skills (Hickok, 2010; Keysers, 2010). Thus, to assume mirror neurons are the root of human empathic responding—an assumption unsupported by research—ignores research findings about causes of empathy that do have strong support.

In summary, then, although the discovery of mirror neuron circuitry is definitely exciting and may indeed prove to be a promising advance in understanding human thought, emotion, and behavior, we must remind ourselves that extraordinary claims require extraordinary evidence—and curb our enthusiasm a little in the meantime.

2.9.2: The Parietal Lobes

To the rear of each frontal lobe lie two oblong patches of cortex that specialize in sensation (see Figure 2.15). These **parietal lobes** allow us to sense the warmth of a hot bath, the smoothness of silk, the poke of a rude elbow, and the gentleness of a caress. A special parietal strip, known as the **somatosensory cortex,** mirrors the adjacent strip of motor cortex we found in the frontal lobe. This somatosensory cortex has two main functions. First, it serves as the primary processing area for the sensations of touch, temperature, pain, and pressure from all over the body (Graziano and others, 2000; Helmuth, 2000). Second, it relates this information to a mental map of the body (the homunculus in Figure 2.16) to help us locate the source of these.

Other maps in the parietal lobes keep track of the position of body parts, so they prevent you from biting your tongue or stepping on your own toes. And, when your leg "goes to sleep" and you can't feel anything but a tingling sensation, you have temporarily interrupted messages from the nerve cells that carry sensory information to body maps in the parietal lobe.

The two hemisphere of the parietal lobe each have specializations of their own. Besides processing sensation and keeping track of body parts, the right parietal lobes help us locate, in three-dimensional space, the positions of external objects detected by our senses. This helps us navigate through our day, from getting out of bed and finding our way into the shower to dressing ourselves, getting ourselves to school or work, and so on. Meanwhile, the left hemisphere's parietal lobe has its own special talents. It specializes in mathematical reasoning and locating the source of speech sounds, as when someone calls your name. It also works with the temporal lobe to extract meaning from speech and writing.

The Parietal Lobes
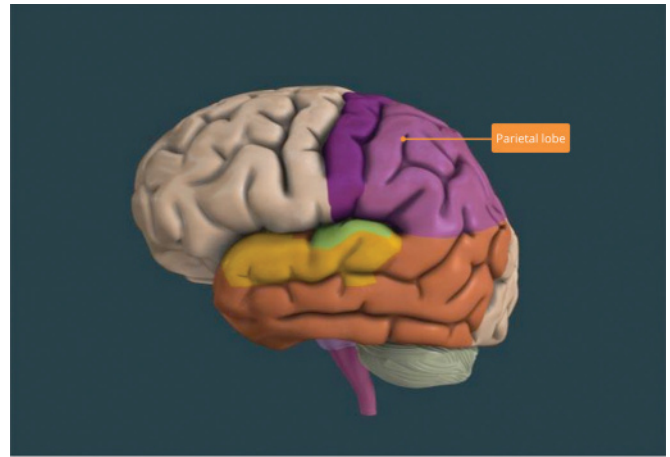
The parietal lobes, behind the frontal lobes, specialize in sensation. The left parietal lobe is important for mathematical reasoning, and the right parietal lobe helps with spatial awareness.

2.9.3: The Temporal Lobes

When the phone rings or a horn honks, the sound registers in your **temporal lobes**, conveniently located above your ears on the lower side of each cerebral hemisphere (see Figure 2.15). There, the auditory cortex helps you make sense of sounds.

The Temporal Lobes
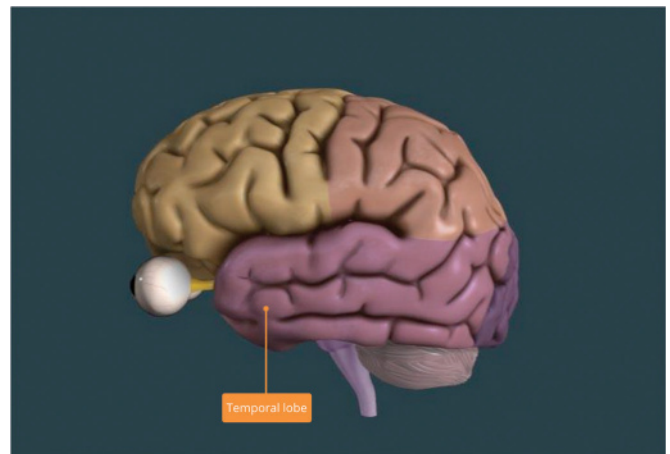
The temporal lobes contain the auditory cortex, which processes sound. Temporal lobes are also involved in memory: left temporal lobe damage can impair memory for language, whereas right temporal lobe damage can affect memory for art and music.

But the temporal lobes take responsibility for more than just hearing. In most people, a specialized section in the left auditory cortex (where it merges into the lower parietal lobe), known as Wernicke's area, helps process the meaning of language. When Jill Bolte Taylor phoned her coworker for help during her stroke, she could hear his words, but they sounded like gibberish to her. "Oh my

gosh, he sounds like a golden retriever!" she thought (Taylor, 2009, p. 56). This was due to the damage underway in Wernicke's area of her brain, inhibiting her ability to understand language. And it doesn't seem to matter if the language is spoken or signed: Research with hearing-impaired individuals finds that they recruit this same area in understanding sign language (Neville and others, 1998).

Wernicke's area
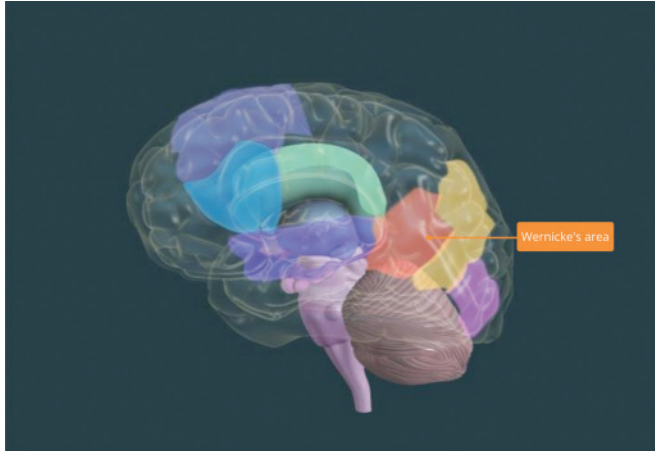
Wernicke's area, in the left temporal lobe, is critical for understanding language.

But that's not all. Portions of the temporal lobes "subcontract" from the visual cortex the work of recognizing faces. Other temporal regions work with the **hippocampus** on the important task of storing long-term memories. There is even a distinct patch of temporal cortex dedicated to perception of the human body (Kanwisher, 2006; Tsao, 2006). Finally, the right temporal lobe plays a significant role in interpreting the emotional tone of language—which explains why the gentle tone of her coworker's voice reassured Jill (with her intact right hemisphere) that he would bring help, despite her inability to understand his words (Taylor, 2009).

2.9.4: The Occipital Lobes

Have you ever "seen stars" after a hard bump to your head? If so, that visual sensation likely resulted from stimulation to your **occipital lobes** at the back of your brain (see Figure 2.15). Under more normal circumstances, the occipital lobes receive messages relayed from the eyes. There, the **visual cortex** integrates the multiple sensory messages and transforms them into recognizable, ongoing images of the world around us.

To construct pictures of the outside world, the brain divides up the incoming visual input and sends it to separate cortical areas for the processing of color, movement, shape, and shading. But the occipital lobes don't do all this work alone. As we noted previously, they coordinate with adjacent areas in the parietal lobes to locate objects in

The Occipital Lobes
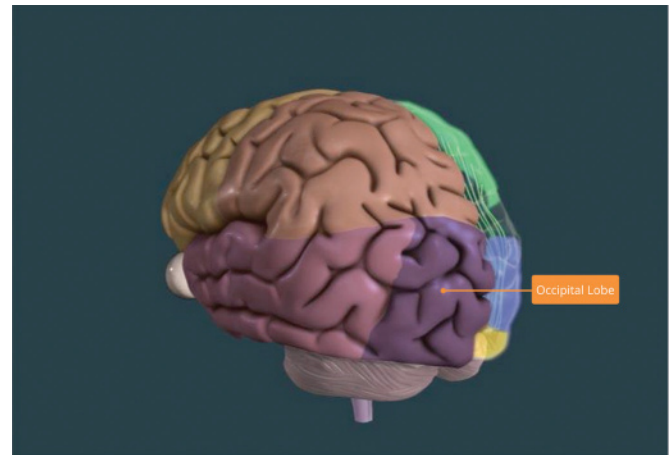
The occipital lobes contain the visual cortex, responsible for processing visual stimuli.

space. They also work with temporal regions to produce visual memories (Ishai & Sagi, 1995; Miyashita, 1995). To complete the picture, we should note that congenitally blind people recruit the visual cortex to help them read Braille (Amedi and others, 2005; Barach, 2003).

2.9.5: The Association Cortex

In accomplishing its magnificent feats of multitasking, our brain relies on the "primary processing areas" of the cortex (the motor, sensory, visual, and auditory cortices we just reviewed) as well as the "association areas" of the cortex (Figure 2.17).

Figure 2.17   The Cooperative Brain

The association areas of the cortex play a key role in interpreting and synthesizing input from the primary areas.
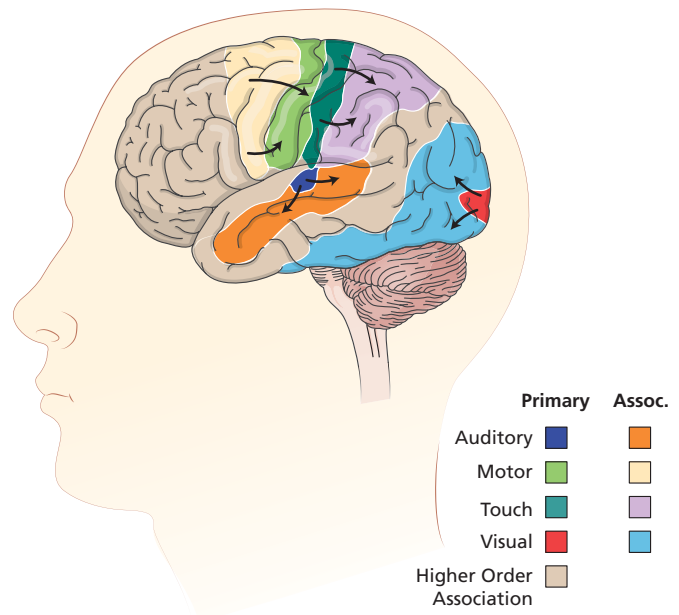
Constituting more than half the cerebral cortex, the **association cortex** was named for the belief that complex thinking relies on associating ideas with each other. But before these associations are made, specific areas of the cortex must process the raw data streaming in from the sense organs.

For example, the primary visual cortex processes raw visual stimulation, such as the letters in a word and whether any are capitalized. Then the visual association cortex takes over to interpret the meaning of the message, such as perceiving the whole of the word or sentence. The auditory association cortex performs similar duties with raw data from the primary auditory cortex, and so on with the other primary cortices and their association cortex companions. Thus, the association cortices help interpret the raw data and put it in the appropriate context so we can understand and use the information it offers. In this way, diverse parts of the association cortex throughout our lobes interpret sensations, lay plans, make decisions, and prepare us for action—precisely the mental powers in which we humans excel and that distinguish us from other animals.

No single part of the brain, however, takes sole responsibility for emotion, memory, personality, or any other complex psychological characteristic: There are no single "brain centers" for any of our major faculties. Rather, every mental and behavioral process involves the coordination and cooperation of many brain networks, each an expert at some highly specialized task (Damasio, 2003; LeDoux, 2002). For example, when you do something as simple as answering a ringing telephone, you hear it with your temporal lobes, interpret its meaning with the help of the frontal lobes, visually locate it with your occipital and parietal lobes, initiate grasping the phone on the orders of your frontal and parietal lobes and your cerebellum, and engage in (possibly) thoughtful conversation, again using frontal and temporal lobe circuitry. And the cortex cannot do its work without communicating with circuits lying deep beneath the surface: the limbic system, thalamus, brain stem, cerebellum, and other structures.

WATCH Your Brain Conversing With a Friend

This video demonstrates just a sampling of the parts of your brain that get involved when you run into a friend and have a conversation.

Clearly, the brain usually manages to "put it all together" in a coordinated effort to understand and respond to the world. Exactly *how* it does so is not clear to neuroscientists and, in fact, constitutes one of the biggest mysteries of modern psychology. Some clues have appeared in recent work, however. Constantly active, even when we are asleep, our brains produce pulses of coordinated electrical waves sweeping over the cortex that are thought, somehow, to coordinate activity in far-flung brain regions (Buzsáki, 2006). All these busy neural networks work in elegant coordination with each other in work and in play, in waking and sleeping, from conception to death—and mostly without our awareness.

2.10: Cerebral Dominance

Objective: **Analyze the similarities and differences between the two hemispheres of the brain.**

Throughout our discussion of various brain structures and their associated functions, we have made some distinctions between functions in the left and right hemispheres. We know, for example, that a person with injury to the right hemisphere would probably not experience language difficulties but could have trouble with spatial orientation—for example, feeling lost in a familiar place or unable to complete a simple jigsaw puzzle. This tendency for each hemisphere to take the lead in different tasks is called **cerebral dominance**, an often-exaggerated concept. Although it is true that some processes are more under the control of the left hemisphere and others are predominantly right-hemisphere tasks, *both hemispheres continually work together to produce our thoughts, feelings, and behaviors*—courtesy of the corpus callosum and its

The Corpus Callosum
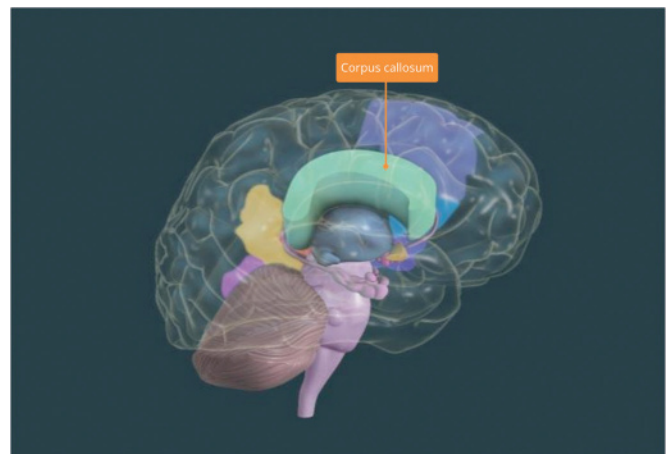
This important structure enables communication between the two hemispheres, allowing them to coordinate with each other on most of our thoughts, feelings, and behaviors.

role in communication between the hemispheres. With that in mind, what differences are there between the hemispheres?

2.10.1: Language and Communication

As we have seen, the left hemisphere usually dominates language functions, although both sides of the brain get involved to some extent. Typically, the left side is more active in manufacturing and processing the "what," or *content,* of speech. The right hemisphere, by contrast, interprets the *emotional tone* of speech (Vingerhoets and others, 2003), as we noted in the case of Jill's stroke. The right hemisphere also takes the lead in interpreting others' emotional responses and their nonverbal communication signals. As for our own emotions, the control of *negative* emotions, such as fear and anger, usually stems from the right frontal lobe, while the left frontal lobe typically regulates *positive* emotions such as happiness (Davidson, 2000b).

2.10.2: Different Processing Styles

Thus, the two hemispheres don't generally compete with each other. Rather, they make different contributions to the same task. In the lingo of neuroscience, the two hemispheres have different but complementary *processing styles.* For example, the left hemisphere groups objects analytically and verbally—as by similarity in function (*knife* with *spoon*)—whereas the right hemisphere might match things by form or visual pattern—as in matching *coin* to *clock*, which are both round objects (Gazzaniga, 1970; Sperry, 1968, 1982). In general, we can describe the left hemisphere's processing style as more *analytic*, *linear*, and *sequential*, whereas the right hemisphere interprets experience more *holistically*, *emotionally*, and *spatially* (Reuter-Lorenz & Miller, 1998). In a normally functioning brain, the two styles complement each other, combining to produce a multifaceted perspective of the world.

In the wake of damage to the brain, though—such as Jill's stroke—the different processing styles may become starkly apparent. In Jill's case, she relied more on linear thinking during the first part of her life: "I spent a lifetime of thirty-seven years being enthusiastically committed to do-do-doing lots of stuff at a very fast pace" (Taylor, 2009, p. 70). The radical shift in her perception caused by the damage to her left hemisphere was noticeable right away, when she found herself incapable of keeping her thoughts on track while trying to plan how to get help. The step-by-step, time-oriented thinking she had taken for granted had vanished, and in its place a completely different perspec-

tive of herself and the world emerged. "I felt no rush to do anything (p. 71)," she marvels, as she remembers her joy in feeling connected to everything around her, in being exquisitely tuned to others' emotions, in taking time to ponder things, and in the deep inner peace that came with her new view of the world that emphasized the right brain's perspective.

If that description sounds like words a person might use to describe a religious or spiritual experience, neurological studies from the University of Pennsylvania may tell us why. Researchers conducted sophisticated brain scans on people who were meditating and found that in peak meditative states, activity in the left association cortex—the area that makes us aware of our body's physical boundaries—declined sharply. Thus, the self-transcendence reported by expert meditators, as well as Jill Taylor's similar feeling of being "one with the universe," appear to have a biological basis: When blood flow to that region of the left hemisphere slows down, our awareness of ourselves as separate and distinct organisms fades (Newberg and others, 2001a). In addition, decreased activity in the left parietal lobe, also noted in studies of meditators, correlates with an altered awareness of one's body in relation to space (Newberg and others, 2001b).

2.10.3: Some People Are Different— But That's Normal

Just to complicate your picture of cerebral dominance, dominance patterns are not always the same from one person to another. Research demonstrating this fact uses a technique called *transcranial magnetic stimulation* (TMS) to deliver powerful (but harmless) magnetic pulses through the skull and into the brain. There, the magnetic fields interfere with the brain's electrical activity, temporarily disabling the targeted region. Surprisingly, when the left-side language areas receive TMS, language abilities in certain people—mostly left-handers—remain unaffected. In general, these studies show that about 1 in 10 individuals process language primarily on the *right* side of the brain. Another 1 in 10—again, mostly left-handers—have language functions distributed equally on both sides of the brain (Knecht and others, 2002). This illustrates the important notion that, despite what we know about the geography of the brain, in reality its precise boundaries are somewhat fluid and can vary in individuals.

2.10.4: Male and Female Brains

In a culture where bigger is often seen as better, the undeniable fact that men (on average) have slightly larger brains than do women has caused heated debate. The real question, of course, is: Does size really matter (in brains, at

least)? Most neuroscientists think it is simply a function of the male's larger body size—and not of much other importance (Brannon, 2008).

Within the brain, certain structures also exhibit sex differences. A part of the hypothalamus commonly believed to be associated with sexual behavior and, perhaps, gender identity is larger in males than in females. Some studies have suggested that male brains are more **lateralized**, whereas females tend to distribute abilities, such as language, across both hemispheres; however, findings in this area are mixed (Sommer and others, 2004). If the difference in lateralization exists, it may explain why women are more likely than men to recover speech after a stroke. Other than that, what advantage this difference may have is unclear.

At present, no one has nailed down any psychological difference that can be attributed with certainty to physical differences between the brains of males and females. The research continues, but we suggest interpreting new claims with a liberal dose of critical thinking, being especially wary of bias that may influence the way results are interpreted. In fact, we will help you do just that in the Critical Thinking: Applied section at the end of this chapter.

2.10.5: The Strange and Fascinating Case of the Split Brain

Imagine what your world might be like if your two hemispheres could *not* communicate—if your brain were, somehow, "split" in two. Would you be, literally, "of two minds"? (See Figure 2.18.)

Figure 2.18 The Corpus Callosum

Only the corpus callosum is severed when the brain is "split." This medical procedure prevents communication between the cerebral hemispheres. Surprisingly, split-brain patients act like people with normal brains under most conditions. Special laboratory tests, however, reveal a duality of consciousness in the split brain.

Corpus callosum
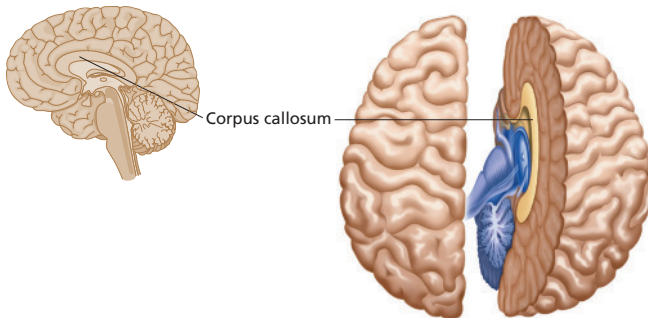
This is not an idle question, because there *are* people with "split brains," the result of a last-resort surgical procedure used to treat a rare condition of almost continuous epileptic seizures. Before their surgery, these patients pro-

duced abnormal electrical bursts of brain waves that seemed to "echo" back and forth between the hemispheres, quickly building into a seizure—much as feedback through a microphone generates a loud screeching noise. So the idea was to cut the corpus callosum—severing the connection between the hemispheres—and thereby prevent the seizure from raging out of control. But was there a psychological price? Curiously, split-brain patients appear mentally and behaviorally unaffected by this extreme procedure under all but the most unusual conditions.

Those unusual conditions involve clever tests contrived by Nobel Prize winner Roger Sperry (1968) and his colleague Michael Gazzaniga (2005). For example, when holding a ball in the left hand (without being able to see it), as shown in Figure 2.19, their split-brain patients could not identify it by touch, yet they had no trouble doing so when the ball was transferred to the right hand.

Figure 2.19 Testing a Split-Brain Patient

Split-brain patients can name unseen objects placed in the right hand, but when an object is placed in the left hand, they cannot name it. Why?

could *not* identify verbally   could identify verbally
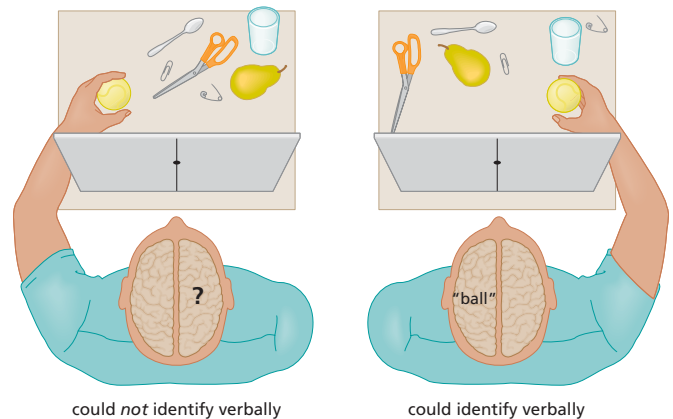
In another test, split-brain patients said they saw nothing when an image of a spoon flashed briefly on the left side of the visual field. Yet, they could reach around a visual barrier with the right hand and easily pick the spoon out of an array of other objects.

How can we explain these odd findings? Let's see if we can use what we have learned in this chapter to solve this peculiar puzzle.

- First, remember that the corpus callosum enables communication between the hemispheres—so, when it is severed, each hemisphere must process information on its own. This explains, also, why split-brain patients can simultaneously draw a circle with one hand and a square with the other (a near-impossible task for those with intact brains. Just try it!)

- Because the sensory pathways cross over to the opposite side as they ascend to the cortex, each side of the body communi-

cates with the opposite side of the brain. So, each hemisphere perceives touch sensation from the hand on the opposite side of the body.

- Language is usually a left-hemisphere function. This, when combined with the **contralateral sensory pathways**, explains why these patients could name objects when they were processed in the left hemisphere. When sensory messages came in from the right visual field or the right hand (such as holding the ball in the right hand), the message went to the left hemisphere, which—thanks to its language abilities—could name the object. Conversely, objects seen in the left visual field or felt in the left hand went to the right hemisphere for processing, where—because the right hemisphere cannot produce speech—patients could not name the object. They could, however, identify it by touch.

TWO CONSCIOUSNESSES   Such cerebral antics point to the most interesting finding in Sperry and Gazzaniga's work: the *duality of consciousness* observed in split-brain patients. When the two hemispheres received different information, it was as if the patient were two separate individuals. One patient told how his left hand would unzip his pants or unbutton his shirt at most inappropriate times, especially when he felt stressed. Another reported his misbehaving left hand turning off the television in the middle of a program he had been watching (Joseph, 1988). Why? Sperry theorized that the right hemisphere—which controls the left hand, but which has little language ability—was merely trying to find a way to communicate by getting attention any way it could (Sperry, 1964).

We must, however, be cautious about generalizing such findings from split-brain patients to individuals with normal brains. Gazzaniga (1998a, 1998b) suggests we think of the human mind as neither a single nor a dual entity but rather as a *confederation of minds*, each specialized to process a specific kind of information. For most people, then, the corpus callosum serves as a connecting pathway that helps our confederation of minds share information. And so we come full circle to Core Concept 2.3, which we encountered at the beginning of this section: The brain is composed of many specialized modules that work together to create mind and behavior (Baynes and others, 1998; Strauss, 1998).

2.10.6: Understanding Brain Damage

Nearly everybody knows someone who has suffered brain damage from an accident, a stroke, or a tumor. Your new knowledge of the brain and behavior will help you understand the problems such people face.

And if you know what abilities have been lost or altered, you can usually make a good guess as to which part of the brain sustained the damage—especially if you bear in mind three simple principles:

1. Because of contralateral processing, each side of the brain communicates with the opposite side of the body. Thus, if symptoms appear on one side of the body, it is likely that the other side of the brain was damaged (Figure 2.20).

Figure 2.20 Contralateral Effects of Damage to the Cerebral Hemispheres
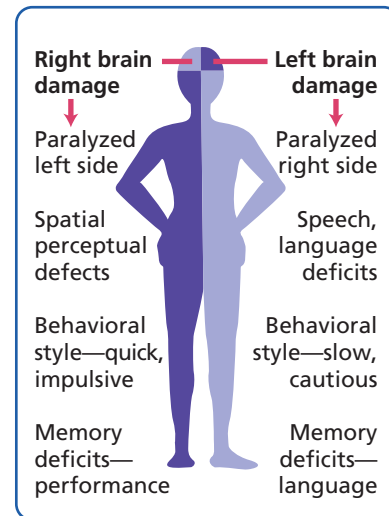
2. For most people, speech is mainly a left-hemisphere function.
3. Each lobe has special functions:
   a. The occipital lobe specializes in vision;
   b. The temporal lobe specializes in hearing, memory, and face recognition;
   c. The parietal lobe specializes in locating sensations in space, including the surface of the body;
   d. The frontal lobe specializes in motor movement, the production of speech, emotion, and certain higher mental functions that we often call "thinking" or "intelligence."

Here's how one of your authors (Bob) applied his knowledge of the brain:

I hadn't noticed Dad dragging the toe of his right foot ever so slightly as he walked. But my mom noticed it on their nightly tour of the neighborhood, when he wasn't keeping up with her brisk pace. I just figured he was slowing down a bit in his later years.

Dad, too, casually dismissed his symptom, but Mom was persistent. She scheduled an appointment with the doctor. In turn, the doctor scheduled a brain scan that showed a remarkably large mass—a tumor—on the left side of Dad's brain. You can see what the neurologist saw in Figure 2.21—an image taken ear-to-ear through the head.

Figure 2.21 MRI Image of a Brain Tumor

This image, showing a side-to-side section toward the back of the head, reveals a large mass on the left side of the brain in a region involved with tracking the position of the right foot. visible at the bottom is a cross-section of the cerebellum. Also visible are the folds in the cerebral cortex covering the brain. Near the center, you can see two of the brain's ventricles (hollow spaces filled with cerebrospinal fluid), which are often enlarged, as they are here, in Alzheimer's disease. The scan is of the father of one of your authors, Bob Johnson.

Based on what you have learned about the brain in this chapter, can you guess what the scan revealed to explain the patient's symptoms?

When I saw the pictures, I knew immediately what was happening. The tumor was located in an area that would interfere with tracking the position of the foot. I knew that each side of the brain communicates with the opposite side of the body—so it made sense that the tumor showing so clearly on the left side of Dad's brain (right side of the image) was affecting communications with his right foot.

The neurologist also told us that the diseased tissue was not in the brain itself. Rather, it was in the saclike layers surrounding the brain and spinal cord. That was good news, in an otherwise bleak report. Still, the mass was growing and putting pressure on the brain. The recommendation was surgery—which occurred after an anxious wait of a few weeks.

During this difficult time, I remember feeling grateful for my professional training. As a psychologist, I knew something about the brain, its disorders, and treatments. This allowed me to shift perspectives—from son to psychologist and back again. It helped me deal with the emotions that rose to the surface when I thought about the struggle for the organ of my father's mind.

Sadly, the operation did not produce the miraculous cure for which we had hoped. Although brain surgery is performed safely on thousands of patients each year—many of whom receive immense benefits in the quality and extended lengths of their lives—one has to remember that it is a procedure usually done on very sick people. In fact, the operation did give Dad some time with us that he may otherwise not have had.

Psychology Matters

Contact Sports and Traumatic Brain Injury

Despite the wondrous abilities of our brains, and the plasticity that often enables full or partial recovery from injury or disease, our brain is still a fragile organ. It can't always rebound from injury. Public awareness of the need to protect our beautiful brain has increased in recent years, as examples of traumatic brain injury (TBI) in contact sports become ever more visible.

One high-profile illustration is the tragic suicide of legendary football star Junior Seau in 2012. Known for being a great motivator, a tough and intense player, a smart businessman, and a beloved citizen of San Diego who devoted much of his time to helping at-risk youth, Seau paid a heavy price for years of "getting his bell rung": His autopsy revealed chronic brain disease associated with a history of concussions. "It was the 'smelling salts and get back in there' generation," says former teammate Natrone Means. Despite his happy, upbeat personality, though, everyone who knew him agreed that in his last several years of life, "Junior wasn't himself anymore." His behavior became more erratic, he struggled with insomnia, and he made a series of increasingly bad decisions—ultimately ending his own life.
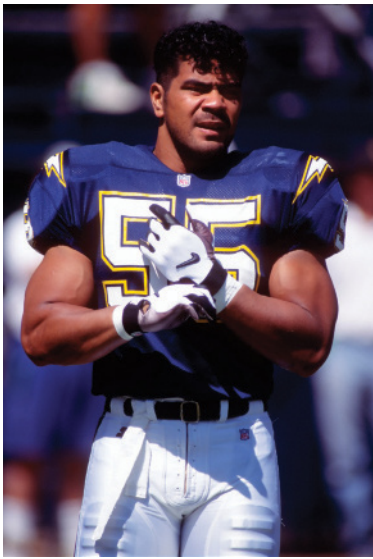
The tragic suicide of NFL superstar Junior Seau brought national attention to concerns about traumatic brain injury in contact sports.

Sadly, Seau's story is not an anomaly. A recent study that examined the medical records of players in the National Football League found that almost 30% of them would experience cognitive impairment in their lifetime—a percentage significantly higher than the general population (O'Brien, 2014). And it isn't just football: TBI can occur from concussions in sports ranging from soccer to skiing and is of particular concern in the worlds of boxing and mixed martial arts. And—perhaps most disturbingly of all—it affects kids and teens in contact sports as well: Emergency rooms treat almost 250,000 young people each year for sports-related brain trauma (White House Fact Sheet, 2014). According to the U.S. Centers for Disease Control and Prevention, repeated concussions in young athletes can cause permanent brain damage (CDC's Heads Up Program, Concussion Fact Sheet, 2013).

TBI also occurs frequently in combat personnel, both during and after deployment. Blasts from improvised explosive devices (IEDs) can cause concussions and TBI more commonly than doctors previously knew. Considered an "invisible" wound, TBI often goes undetected, and the veterans return home only to struggle with insomnia, headaches, dizziness, or troubles with balance or concentration. These typical symptoms of TBI can be successfully treated, however—*if* they are diagnosed.

Fortunately, both professional and youth organizations are beginning to take TBI more seriously, screening more routinely for concussions, working toward more protective headgear, and implementing more stringent and earlier treatment for concussions. In the military, a vast number of resources are being devoted to better detection and more immediate and effective treatment of brain injuries. And that is good news for all of us: While TBI has gained attention based on stories of wounded warriors and athletes, far more people incur brain injury from common situations such as falling or being involved in an auto accident. University of California neurosurgeon Gerry Manley points out that many people with TBI are never diagnosed and thus end up living with long-term problems in areas ranging from sensory deficits to speech and language to cognitive processing and even emotional impairments. In fact, 1 in 50 of the U.S. population is estimated to be living with disabilities caused by TBI, costing approximately $77 billion per year in national health care costs (Norris, 2013). For more information, check out the websites of the Brain Trauma Foundation http://www.braintrauma.org and the HEADS UP Program of the U.S. Centers for Disease Control and Prevention http://www.cdc.gov/headsup/.

WRITING PROMPT

Increasing TBI Awareness

Identify someone you know whose activities may put him or her at risk for TBI, through a sport, a type of employment, or hobby. Develop a brief commentary using what you've learned to bring awareness of TBI symptoms to this person This can be in the form of a note or conversation.

▶ `The response entered here will appear in the performance dashboard and can be viewed by your instructor.`

Submit

Critical Thinking Applied: Left Brain versus Right Brain
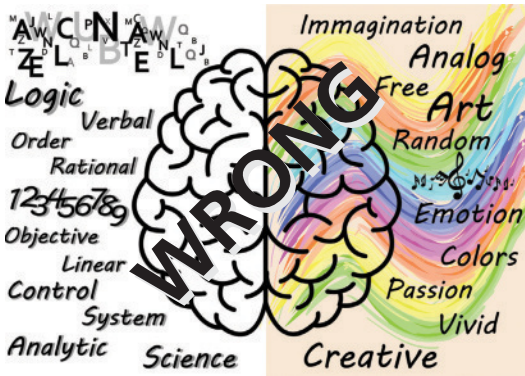
Are most people really "left-brained" or "right-brained?" Or is the truth not quite so simple?

Would you rather solve a math problem or create a painting? Write an essay on an academic topic or invent a fictional story? According to pop science, the way you answer questions like this reveals whether you are a "left-brain" person or a "right-brain" person. Furthermore, the same sources often then encourage you to use that information to choose a career. Is there any truth to these claims?

The split-brain studies and the discovery that the two sides of the brain process information differently have certainly captured public interest. Press reports claiming the left hemisphere is logical and the right hemisphere is emotional might easily lead to the mistaken conclusion that your friend Jamal, a guy with an analytic bent, lives mostly in his left hemisphere, while his wife Barb, more sensitive to people's emotions, filters her experience mainly through the right side of her brain.

Knowing a fad when they see it, pseudoscientists have developed workshops to help plodding analytical types get into their "right minds." Before you jump on this particular bandwagon, though, let's dig a little deeper. The idea that people fall neatly into one category or another has popular appeal, but do the facts bear this out? Recent findings in neuroscience should be able to tell us how the left and right brain interact and whether people really are right-or left-brained. What questions, then, do we need to ask and answer in order to get to the truth of this popular notion?

Is the Claim Reasonable or Extreme?

As we have seen in this chapter, the notion that we rely on one side of the brain, largely to the exclusion of the other, is an exaggeration. Rather, we use both sides, in coordination with each other, all the time. As we often find in extreme claims, the "left brain vs. right brain" issue has oversimplified the scientific findings of hemispheric differences: People rarely fit neatly into one of two dichotomous categories. This serves as a good example of how honest findings (such as the work reported in this chapter on the differences between the hemispheres) often become wildly exaggerated by the time they reach the popular news media. We should always digest these reports with a healthy dose of skepticism and a close look at the evidence.

What Is the Evidence?

As we have seen, the two hemispheres have somewhat different *processing styles*, but the actual differences between the two hemispheres do not outweigh their similarities (Banich, 1998; Trope and others, 1992). Most important—and what the right-brain/left-brain faddists overlook—is that the two hemispheres of the intact brain cooperate with each other, each making its own complementary contribution to our mental lives.

Could Bias Contaminate the Conclusion?

Two biases come easily to mind as we consider this issue. First—as we mentioned earlier—some businesses have made fortunes "selling" this idea, which creates an obvious bias if these same businesses are trying to convince you of its veracity. **Emotional bias** is likely present as well. After all, we humans like to classify things and people into categories: It appeals to our sense of order and soothes our need to resolve complex issues. Small wonder, then, that we often latch on to typologies that purport to explain human nature, characteristics, and behavior by placing them in simplistic categories.

What Conclusions Can We Draw?

Unless you have a split brain, you bring the abilities of both sides of your brain to bear on everything you do. Why, then, do people have such obvious differences in the way they approach the same tasks? Some people *do* seem to approach things in a more analytical, logical fashion; others operate from a more intuitive and emotional perspective. But now that you know something of how the brain works, you understand that we cannot account for these differences simply by suggesting people employ one side of their brain or the other. Even split-brain patients use both sides of their brains! A better explanation involves different combinations of experience and brain physiology. People are different because of different combinations of nature and nurture—not because they use opposite sides of the brain.

Using Both Sides of Your Brain

Think of something you enjoy doing—it might be playing a particular sport or making music, cooking or having dinner with friends, studying or shopping. Now, imagine doing it for a couple of hours and all the minute details of what would likely occur in that period of time. Make a note of some of them and then try to identify which parts of the activity might be led by your left hemisphere and which parts of the activity are more likely coordinated by your right hemisphere.

► The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

Summary: Biopsychology, Neuroscience, and Human Nature

Chapter Problem

What does Jill Bolte Taylor's experience teach us about how our brain is organized and about its amazing ability to adapt?

- Our brain communicates through **contralateral pathways**, so that sensory information from one side of the body is processed by the opposite **cerebral hemisphere**.
- Brain **plasticity** allows us to regain or rewire functions lost due to damage or trauma.
- Our brain is composed of a group of specialized structures, each of which performs certain tasks, but which all work together to produce thought, behavior, and emotion.

How Are Genes and Behavior Linked?

Core Concept 2.1

Evolution has fundamentally shaped psychological processes because it favors genetic variations that produce adaptive behavior.

Charles Darwin's theory of evolution explains behavior as the result of **natural selection**. Variation among individuals and competition for resources lead to survival of the most adaptive behavior as well as the fittest physical features. This principle underlies human behavior as well as that of other animals.

Genetics has clarified the biological basis for natural selection and inheritance. Our **chromosomes** contain thousands of **genes**, carrying traits inherited from our parents. Each gene consists of a **DNA** segment that encodes for a protein. Proteins, in turn, serve as the building blocks for the organism's structure and function, including the functioning of the brain. Although DNA remains stable over a person's life, the effects of our experience influence our **epigenome**, creating a lasting imprint that impacts our outcomes. Genetic research is nearing the point at which we may alter our genetic makeup or select certain genetic traits for our children. This new knowledge brings with it ethical choices that humans have never had to face before.

How Does the Body Communicate Internally?

Core Concept 2.2

The brain coordinates the body's two communications systems, the nervous system and the endocrine system, which use similar chemical messengers to communicate with targets throughout the body.

The body's two communication systems are the **nervous system** and the **endocrine system**. **Neurons** receive messages by means of stimulation of the **dendrites** and **soma**. When sufficiently aroused, a neuron generates an **action potential** along the **axon**. **Neurotransmitter** chemicals relay the message to receptors on cells across the **synapse**. **Plasticity** enables our brain to develop strengths based on our particular environment and experiences.

The nervous system has two main divisions: the **central nervous system** and the **peripheral nervous system**. The PNS, in turn, comprises the **somatic nervous system** (further divided into sensory and motor pathways) and the **autonomic nervous system**, which communicates with internal organs and glands. The **sympathetic division** of the autonomic nervous system is most active under stress, while the **parasympathetic division** attempts to maintain the body in a calmer state. The glands of the slower endocrine system also communicate with cells around the body by secreting **hormones** into the bloodstream. Endocrine system activity is controlled by the **pituitary gland**, attached to the base of the brain, where it receives orders from the hypothalamus. Psychoactive drugs affect the nervous system by influencing the effects of neurotransmitters by acting as **agonists** or **antagonists**. Unfortunately for people taking

psychoactive drugs, many neural pathways in the brain may employ the same neurotransmitter, causing unwanted side effects.

How Does the Brain Produce Behavior and Mental Processes?

> **Core Concept 2.3**
>
> **The brain is composed of many specialized modules that work together to create mind and behavior.**

In modern times, researchers have opened windows on the brain, using the **EEG** to sense the brain's electrical activity. In recent years, computer technology has led to brain-scanning techniques, such as **CT**, **PET**, **MRI**, and **fMRI**—each having its advantages and disadvantages. We can conceive of the brain as being organized in three integrated layers. The **brain stem** and associated structures (including the **medulla**, **reticular formation**, **pons**, **thalamus**, and **cerebellum**) control many vital body functions, along with influencing alertness and motor movement. The **limbic system** (including the **hippocampus**, **amygdala**, and **hypothalamus**) plays a vital role in motivation, emotion, and memory. The **cerebral cortex** contains highly specialized modules. Its **frontal lobes** control motor functions, including speech, and higher mental functions. The **parietal lobes** specialize in sensation, especially the senses of touch and body position, as well as the understanding of speech. The **occipital lobes** deal exclusively with vision, while the **temporal lobes** have multiple roles involved in face recognition, hearing, and smell. Even though the functions of the brain are highly localized within specific modules, they normally work seamlessly together: Every mental and behavioral process involves the coordination and cooperation of many brain networks. The **association cortex** integrates the multitude of raw data into a coherent perception.

Although the two hemispheres are more similar than different, they are each equipped with specialties. Language, analytical thinking, and positive emotions are regulated primarily by circuits in the left hemisphere. The right hemisphere specializes in spatial interpretation, visual and musical memory, and negative emotions. The two hemispheres communicate across the **corpus callosum**. If the hemispheres are surgically severed, as when the corpus callosum is cut in split-brain patients, a duality of consciousness emerges. Because each side of the body has sensory and motor links to the opposite side of the brain, a split-brain patient who "sees" an object in only one hemisphere of the brain will only be able to locate that object by touch using the hand linked to the same hemisphere.

Critical Thinking Applied: Left Brain versus Right Brain

Pop science dichotomizes people into left-brained and right-brained people, based on whether they tend to be more analytical or intuitive. A closer look at the evidence for *hemispheric specialization*, however, reveals that this dichotomy is wildly oversimplified.

Chapter 3
Sensation and Perception

The shimmering quality of *Coquelicots*, by Claude Monet, is produced by a quirk in the visual system—to be explained in this chapter.

⌄ Core Concepts

3.1 The brain senses the world indirectly because the sense organs convert stimulation into the language of the nervous system: neural messages.

3.2 The senses all operate in much the same way, but each extracts different information and

sends it to its own specialized processing regions in the brain.

3.3 Perception brings *meaning* to sensation, so perception produces an interpretation of the world, not a perfect representation of it.

CAN YOU IMAGINE WHAT YOUR WORLD WOULD BE LIKE IF YOU COULD NO LONGER see colors—but merely black, white, and gray? Such a bizarre sensory loss befell Jonathan I., a 65-year-old New Yorker, following an automobile accident, which caused damage to a region in Jonathan's brain that processes color information. Details

of his case appear in neurologist Oliver Sacks's 1995 book, *An Anthropologist on Mars*.

At first, Jonathan also experienced amnesia for reading letters of the alphabet, which all seemed like a jumble of nonsensical markings. But, after 5 days, his inability to read disappeared. His loss of color vision, however, persisted as

a permanent condition, known as *cerebral achromatopsia* (pronounced *ay-kroma-TOP-see-a*). Curiously, Jonathan also lost his memory for colors: He could no longer imagine, for instance, what "red" once looked like.

As you might expect, Jonathan became depressed by this turn in his life. And the problem was aggravated by his occupation. You see, Jonathan was a painter who had based his livelihood on representing his visual images of the world in vivid colors. Now this whole world of color was gone. Everything was drab—all "molded in lead." When he looked at his own paintings now, paintings that had seemed bursting with special meaning and emotional associations, all he could see were unfamiliar and meaningless objects on canvas.

Still, Jonathan's story has a more or less happy ending, one that reveals much about the resilience of the human spirit. Jonathan became a "night person," traveling and working at night and socializing with other night people. (As we will see in this chapter, good color vision depends on bright illumination such as daylight; most people's color vision is not as acute in the dark of night.) He also became aware that what remained of his vision was remarkably good, enabling him to read license plates from four blocks away at night. Jonathan began to reinterpret his "loss" as a "gift" in which he was no longer distracted by color so that he could now focus his work more intensely on shape, form, and content. Finally, he switched to painting only in black and white. Critics acclaimed his "new phase" as a success. He has also become a skilled sculptor, which he had never attempted before his accident. So, as Jonathan's world of color died, a new world of "pure forms" was born in his perception of the people, objects, and events in his environment.

What lessons can we learn from Jonathan's experience? His unusual sensory loss tells us that our picture of the world around us depends on an elaborate sensory system that processes incoming information. In other words, we don't experience the world directly, but instead through a series of "filters" that we call our *senses.* By examining such cases of sensory loss, psychologists have learned much about how the sensory processing system works. And, on a more personal level, case studies like Jonathan's allow us momentarily to slip outside our own experience to see more clearly how resilient humans can be in the face of catastrophic loss.

But Jonathan's case also raises some deeper issues. Many conditions can interfere with vision and, specifically, with the ability to see colors: abnormalities in the eyes, the optic nerve, or the brain. But Jonathan's loss also forces us to ask: Do colors exist in the world outside us—or is it possible that color is a creation of our brains?

At first, such a question may seem absurd. But let's look a little deeper. Yes, we will argue that color—and, in fact, all sensation—is a creation of the brain. But perhaps the more profound issue is this:

> **CHAPTER PROBLEM: Is there any way to tell whether the world we "see" in our minds is the same as the external world—and whether we see things as most others do?**

This chapter will show you how psychologists have addressed such questions. The chapter also takes us the next logical step beyond the brain's topography to a consideration of how information from the outside world gets into the brain and how the brain makes sense of it.

Sensation versus Perception

Although the very private processes that connect us with the outside world extend deep into the brain, we will begin our chapter at the surface—at the sense organs. This is the territory of *sensory psychology.* We will define **sensation** simply as the process by which a stimulated receptor (such as the eyes or ears) creates a pattern of neural messages that represent the stimulus in the brain, giving rise to our initial experience of the stimulus. An important idea to remember is that sensation involves converting stimulation (such as a pinprick, a sound, or a flash of light) into a form the brain can understand (neural signals)—much as a cell phone converts an electronic signal into sound waves you can hear.

Psychologists who study sensation do so primarily from a **biological perspective**. As you will see, they have found that all our sense organs are, in some very basic ways, much alike. All the sense organs transform physical stimulation (such as light waves or sound waves) into the neural signals that give us sensations, such as the experience of light or sound. In this chapter, you will learn about how we sense color, odor, sound, texture, and taste. By the end of our excursion, you will know why tomatoes and limes have different hues, why a pinprick feels different from a caress, and why seeing doesn't always give us an accurate basis for believing.

Happily, under most conditions, our sensory experience is highly reliable. So when you catch sight of a friend, the sensation usually registers clearly, immediately, and accurately. Yet, we humans do have our sensory limitations—just as other creatures do. In fact, we lack the acute senses so remarkable in many other species: the vision of hawks, the hearing of bats, the sense of smell of rodents, or the sensitivity to magnetic fields found in migratory birds.

So do we humans excel at anything? Yes. Our species has evolved the sensory equipment that enables us to process a wider range and variety of sensory input than any other creature.

These Arctic terns use the earth's magnetic fields to chart their migration, traveling 44,000 miles each year, from Greenland to Antarctica!

But sensation is only half the story. Our ultimate destination in this chapter lies, beyond mere sensation, in the amazing realm of **perception**. There we will uncover the psychological processes that attach meaning and personal significance to the sensory messages entering our brains. *Perceptual psychology* will help you understand how we assemble a series of tones into a familiar melody or a collage of shapes and shadings into a familiar face. More generally, we will define perception as a mental process that elaborates and assigns meaning to the incoming sensory patterns. Thus, perception creates an interpretation of sensation.

Perception gives answers to such questions as: What do I see—a tomato? Is the sound I hear a church bell or a doorbell? Does the face belong to someone I know? Until quite recently, the study of perception was primarily the province of psychologists using the cognitive perspective. Now that brain scans have opened new "windows" on perceptual processes in the brain, neuroscientists have joined them in the quest to find biological explanations for perception.

As you can see, the boundary of sensation blurs into that of perception. Perception is essentially an interpretation and elaboration of sensation. Seen in these terms, sensation refers just to the initial steps in the processing of a stimulus. It is to these first sensory steps that we now turn our attention.

Key Question: How Does Stimulation Become Sensation?

> **Core Concept 3.1**
>
> **The brain senses the world indirectly because the sense organs convert stimulation into the language of the nervous system: neural messages.**

A thunderstorm is approaching, and you feel the electric charge in the air make the hair stand up on your neck. Lightning flashes, and a split second later, you hear the thunderclap. It was close by, and you smell the ozone left in the wake of the bolt as it sizzled through the air. Your senses are warning you of danger.

Our senses have other adaptive functions, too. They aid our survival by directing us toward certain stimuli, such as tasty foods, which provide nourishment. Our senses also help us locate mates, seek shelter, and recognize our friends. And, not incidentally, our senses also provide the pathway to the pleasure we find in music, art, athletics, food, and sex.

How do they accomplish all this? The complete answer is complex, but it involves one elegantly simple idea that applies across the sensory landscape: Our sensory impressions of the world involve *neural representations* of stimuli—not the actual stimuli themselves. The core concept puts it this way:

> The brain senses the world indirectly because the sense organs convert stimulation into the language of the nervous system: neural messages.

The brain never receives stimulation directly from the outside world. Its experience of a tomato is not the same as the tomato itself—although we usually assume that the two are identical. Neither can the brain receive light from a sunset, reach out and touch velvet, or inhale the fragrance of a rose. Instead, it must rely on secondhand information from the go-between sensory system, which delivers only a coded neural message. From that secondhand message, the brain must create its own experience (see Figure 3.1). Just

Figure 3.1 Stimulation Becomes Perception

Stimulation ⟶ Transduction ⟶ Sensation ⟶ Perception

Light waves   Neural signals
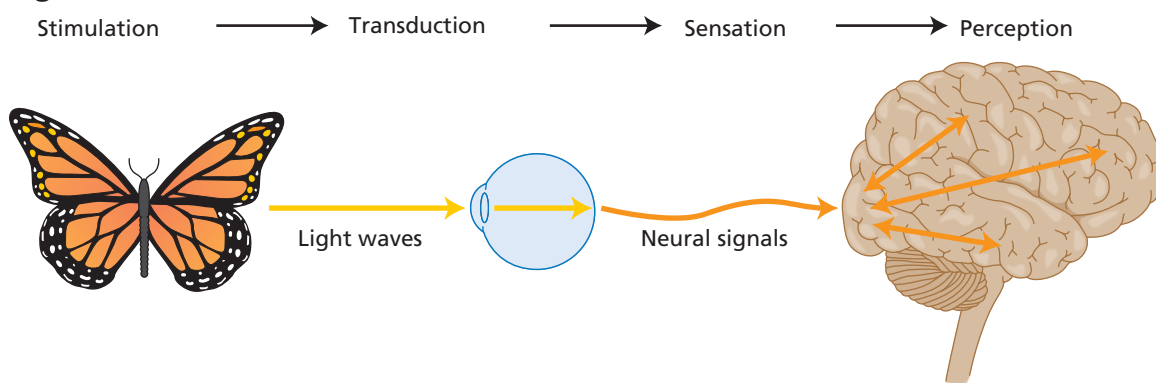
as you cannot hear phone messages without a phone that converts the electronic energy into sound you can hear, your brain needs its sensory system to convert the stimuli from the outside world into neural signals that it can process and understand.

To understand more deeply how the world's stimulation becomes the brain's sensation, we need to think about three attributes common to all the senses: transduction, sensory adaptation, and thresholds. They determine which stimuli will actually become sensation, what the quality and impact of that sensation will be, and whether it grabs our interest. These attributes determine, for example, whether a tomato actually registers in the sensory system strongly enough to enter our awareness, what its color and form appear to be, and how strongly it bids for our attention.

WRITING PROMPT

Your Own Example of the Path from Stimulation to Perception

Give an example of how stimulation becomes perception. Your example might involve vision (as in the butterfly example just given), or it could involve other senses, such as hearing, smell, or taste. Be sure that you distinguish stimulation, sensation, and perception. Also indicate the point at which transduction takes place.

▶
```
The response entered here will appear in the
performance dashboard and can be viewed by
your instructor.
```

[Submit]

By the end of this section, you will be able to:

3.1 Explain the concept of *transduction.*

3.2 Explain the concept of *thresholds* and how they influence sensation.

3.3 Explain how *signal detection theory* improved our understanding of sensation.

3.1: Transduction: Changing Stimulation to Sensation

Objective: Explain the concept of *transduction.*

It may seem incredible that basic sensations, such as the redness and flavor of our tomato—or the colors Jonathan could see before his accident—are entirely creations of the sense organs and brain. But remember that all sensory communication with the brain flows through neurons in

the form of neural signals: Neurons cannot transmit light or sound waves or any other external stimulus. Accordingly, none of the light bouncing off the tomato ever actually reaches the brain. In fact, incoming light only travels as far as the back of the eyes. There the information it contains is converted to neural messages. Likewise, the chemicals that signal taste make their way only as far as the tongue, not all the way to the brain.

In all the sense organs, it is the job of the *sensory receptors*, such as the eyes and ears, to convert incoming stimulus information into electrochemical signals—neural activity—the only language the brain understands. As Jonathan I.'s case suggests, sensations, such as "red" or "sweet" or "cold," occur only when the neural signal reaches the cerebral cortex. The whole process seems so immediate and direct that it fools us into assuming that the sensation of redness is really a characteristic of a tomato or the sensation of cold is a characteristic of ice cream. But they are not! (You can discover how light is not necessary for sensations of light with the demonstration in the *Do It Yourself!* box, "Phosphenes Show That Your Brain Creates Sensations.)

Psychologists use the term **transduction** for the sensory process that converts the information carried by a physical stimulus, such as light or sound waves, into the form of neural messages. Transduction begins when a sensory neuron detects a physical stimulus (such as the sound wave made by a vibrating guitar string). When the appropriate stimulus reaches a sense organ, it activates specialized neurons, called *receptors*, that respond by converting their excitation into a nerve signal. This happens in much the same way that a bar-code reader (which is, after all, merely an electronic receptor) converts the series of lines on a candy bar into an electronic signal that a computer can match with a price.

In our own sensory systems, neural impulses carry the codes of sensory events in a form that can be further processed by the brain. To get to its destination, this information-carrying signal travels from the receptor cells along a *sensory pathway*—usually by way of the **thalamus** and on to specialized sensory processing areas in the brain. From the coded neural impulses arriving from these pathways, the brain then extracts information about the basic qualities of the stimulus, such as its intensity, color, and movement. Please keep in mind, however, that the stimulus itself terminates in the receptor: The only thing that flows into the nervous system is *information* carried by the neural impulse.

Let's return now to the problem we set out at the beginning of the chapter: How could we tell whether the world we "see" in our minds is the same as the external world—and whether we see the world as others do? The idea of **t**ransduction gives us part of the answer. Because we do *not* see (or hear, or smell . . .) the external world

directly, what we sense is an electrochemical rendition of the world created by the sensory receptors and the brain. To give an analogy: Just as digital photography changes a scene first into electronic signals and then into drops of ink on a piece of paper, so the process of sensation changes the world into a pattern of neural impulses realized in the brain.

Do It Yourself!
Phosphenes Show That Your Brain Creates Sensations

One of the simplest concepts in perceptual psychology is among the most difficult for most people to grasp: The brain and its sensory systems create the colors, sounds, tastes, odors, textures, and pains that you sense. You can demonstrate this to yourself in the following way.

Close your eyes and press gently with your finger on the inside corner of one eye. On the opposite side of your visual field, you will "see" a pattern caused by the pressure of your finger—not by light. These light sensations are *phosphenes*, visual images caused by fooling your visual system with pressure, which stimulates the optic nerve in much the same way light does. Direct electrical stimulation of the occipital lobe, sometimes done during brain surgery, can have the same effect. This shows that light waves are not absolutely necessary for the *sensation* of light. The sensory experience of light, therefore, must be a creation of the brain rather than a property of objects in the external world.

Figure 3.2 How to Create a Phosphene

sensation of light

Phosphenes may have some practical value, too. Several laboratories are working on ways to use phosphenes created by stimulation sent from a small TV camera to the occipital cortex to create visual sensations for people who have lost

their sight (Wickelgren, 2006). Another promising approach under development involves replacing a section of the retina with an electronic microchip (Boahen, 2005; Liu and others, 2000). We hasten to add, however, that this technology is in its infancy (Cohen, 2002; U.S. Department of Energy, 2013).

3.2: Thresholds: The Boundaries of Sensation

Objective: **Explain the concept of *thresholds* and how they influence sensation.**

- *What is the weakest stimulus an organism can detect?*
- *How dim can a light be and still be visible?*
- *How soft can music be and still be heard?*

These questions refer to the **absolute threshold** for different types of stimulation, which is the minimum amount of physical energy needed to produce a sensory experience. In the laboratory, a psychologist would give the **operational definition** as the intensity at which the stimulus is detected accurately half of the time over many trials. This threshold will vary from one person to another. So if you point out a faint star to a friend who says he cannot see it, the star's light is above your absolute threshold (you can see it) but below that of your friend (who cannot).

A faint stimulus does not abruptly become detectable as its intensity increases. Because of the fuzzy boundary between detection and nondetection, a person's absolute threshold is not absolute! In fact, it varies continually with our mental alertness and physical condition. Experiments designed to determine thresholds for various types of stimulation were among the earliest studies done by psychologists—who called this line of inquiry *psychophysics.* Table 3.1 shows some typical absolute threshold levels for several familiar natural stimuli.

Table 3.1 Approximate Sensory Thresholds of Five Senses

Sense	Detection Threshold
Sight	A candle flame at 30 miles on a clear, dark night
Hearing	Someone breathing normally 20 feet away in a quiet room
Smell	One drop of perfume diffused throughout a three-room apartment
Taste	One teaspoon of sugar in 2 gallons of water
Touch	A bee's wing falling on the cheek from 1 centimeter above

We can illustrate another kind of threshold with the following imaginary experiment. Suppose you are relaxing by watching television on the one night you don't need to study, while a roommate busily prepares for an early morning exam. Your roommate asks you to "turn it down a little" to eliminate the distraction. You feel that you should make

some effort to comply but really wish to leave the volume as it is. What is the least amount you can lower the volume to prove your good intentions, while still keeping the sound clearly audible? Your ability to make judgments like this one depends on your **difference threshold** (also called the *just noticeable difference* or *JND*), the smallest physical difference between two stimuli that a person can reliably detect 50% of the time.

If you turn down the volume as little as possible, your roommate might complain, "I don't hear any difference." By this, your roommate probably means that the change in volume does not match his or her difference threshold. By gradually lowering the volume until your roommate says "when," you will be able to find the difference threshold that keeps the peace in your relationship.

Investigation of the difference thresholds across the senses has yielded some interesting insights into how human stimulus detection works. It turns out that *the JND is always large when the stimulus intensity is high and small when the stimulus intensity is low.* Psychologists refer to this idea—that the size of the JND is proportional to the intensity of the stimulus—as **Weber's law**. And what does Weber's law tell us about adjusting the TV volume? If you have the volume turned up very high, you will have to turn it down a lot to make the difference noticeable. On the other hand, if you already have the volume set to a very low level, a small adjustment will probably be noticeable enough for your roommate. The same principle operates across all our senses. Knowing this, you might guess that a weight lifter would notice the difference when small amounts are added to light weights, but it would take a much larger addition to be noticeable with heavy weights.

What does all this mean for our understanding of human sensation? The general principle is this: We are built to detect *changes* in stimulation and *relationships* among stimuli. You can see how this works in the *Do It Yourself!* box, "An Enlightening Demonstration of Sensory Relationships."

Do It Yourself!
An Enlightening Demonstration of Sensory Relationships

In this simple demonstration, you will see how detection of change in brightness is relative, not absolute. Find a three-way lamp equipped with a bulb having equal wattage increments, such as a 50-100-150-watt incandescent bulb. (Wattage is closely related to brightness.) Then, in a dark room, switch the light on to 50 watts, which will seem like a *huge* increase in brightness relative to the dark. Next, turn the switch to change from 50 to 100 watts: This will also seem like a large increase— but not so much as it did when you originally turned on the light in the dark. Finally, switch from 100 to 150 watts. Why does this last 50-watt increase, from 100 to 150 watts, appear only slightly brighter?

Your visual system does not give you an *absolute* sensation of brightness; rather, it provides information about the *relative* change. That is, it compares the stimulus change to the background stimulation, translating the jump from 100 to 150 watts as a mere 50% increase (50 watts added to 100) compared to the earlier 100% increase (50 watts added to 50). This illustrates how your visual system computes sensory relationships rather than absolutes—and it is essentially the same with your other senses.

3.3: Signal Detection Theory

Objective: **Explain how *signal detection theory* improved our understanding of sensation.**

A deeper understanding of absolute and difference thresholds comes from **signal detection theory** (Green & Swets, 1966). Originally developed for engineering electronic sensors, signal detection theory uses the same concepts to explain both the electronic sensing of stimuli by devices, such as your TV set, and by the human senses, such as vision and hearing.

According to signal detection theory, sensation depends on the characteristics of the stimulus, the background stimulation, and the detector. Thus, how well you receive a stimulus, such as a professor's lecture, depends on the presence of competing stimuli in the background—the clacking keys of a nearby laptop or intrusive fantasies about a classmate. It will also depend on the condition of your "detector"—your brain—and, perhaps, whether it has been aroused by a strong cup of coffee or dulled by drugs or lack of sleep.

Signal detection theory also helps us understand why thresholds vary—why, for example, you might notice a certain sound one time and not the next. The classical theory of thresholds ignored the effects of the perceiver's physical condition, judgments, or biases. Thus, in classical *psychophysics* (as the study of stimulation, thresholds, and sensory experience was called before signal-detection theory came along), if a signal were intense enough to exceed one's absolute threshold, it would be sensed; if below the threshold, it would be missed. In the view of modern signal detection theory, sensation is not a simple yes-or-no experience but a *probability* that the signal will be detected and processed accurately.

So, what does signal detection theory offer psychology that was missing in classical psychophysics? One factor is the variability in human judgment. Another involves the conditions in which the signal occurs. Signal detection theory recognizes that the observer, whose physical and mental

status is always in flux, must compare a sensory experience with ever-changing expectations and biological conditions. When something "goes bump in the night" after you have gone to bed, you must decide whether it is the cat, an intruder, or just your imagination. But what you decide it is depends on factors such as the keenness of your hearing and what you expect to hear, as well as other noises in the background. By taking into account the variable conditions that affect detection of a stimulus, signal detection theory provides a more accurate portrayal of sensation than did classical psychophysics.

In a combat setting, signal detection is heightened, as soldiers are highly motivated to notice danger, they expect to encounter danger, and with experience their senses become more finely attuned to indications of danger.

Psychology Matters

Sensory Adaptation

If you have ever jumped into a cool pool on a hot day, you know that sensation is critically influenced by *change*. In fact, a main role of our stimulus detectors is to announce changes in the external world—a flash of light, a splash of water, a clap of thunder, the approach of a lion, the prick of a pin, or the burst of flavor from a dollop of salsa. Thus, our sense organs are *change detectors*. Their receptors specialize in gathering information about new and changing events.

The great quantity of incoming sensation would quickly overwhelm us, if not for the ability of our sensory systems to adapt. **Sensory adaptation** is the diminishing responsiveness of sensory systems to prolonged stimulation, as when you adapt to the feel of swimming in cool water. In fact, any unchanging stimulation usually shifts into the background of our awareness unless it is quite intense or painful. On the other hand, any change in stimulation (as when a doorbell rings) will immediately draw your attention.

Incidentally, sensory adaptation accounts for the background music often played in stores being so forgettable: It has been deliberately selected and filtered to remove any large changes in volume or pitch that might distract attention from the merchandise. (On the other hand, do you see why it's not a good idea to listen to your favorite music while studying?)

Key Question: How Are the Senses Alike? How Are They Different?

Core Concept 3.2

The senses all operate in much the same way, but each extracts different information and sends it to its own specialized processing regions in the brain.

Vision, hearing, smell, taste, touch, pain, body position: In certain ways, all these senses are the same. We have seen that they all transduce stimulus energy into neural impulses. They are all more sensitive to change than to constant stimulation. And they all provide us information about the world—information that has survival value. **But how are they** *different?*

With the exception of pain, each sense taps a different form of stimulus energy, and each sends the information it extracts to a different part of the brain. These contrasting ideas lead us to our core concept for this section:

The senses all operate in much the same way, but each extracts different information and sends it to its own specialized processing regions in the brain.

As a result, *different sensations occur because different areas of the brain receive the messages.* Whether you hear a bell or see a bell depends ultimately on which part of the brain processes the input. We will explore how this all works by looking at each of the senses in turn. First, we will focus on the visual system—the best-understood of the senses—to discover how it transduces light waves into visual sensations of color and brightness.

By the end of this section, you will be able to:

3.4 **Explain how the visual system processes light, to give us visual sensation.**

3.5 **Explain how the auditory system produces sound.**

3.6 **Explain how the senses of body position, movement, smell, taste, touch, and pain work. Describe the similarities to vision and hearing.**

3.7 **Explain what synesthesia teaches us about how the brain processes sensation.**

3.4: Vision

Objective: **Explain how the visual system processes light, to give us visual sensation.**

Animals with good vision have an enormous biological advantage. This fact has exerted evolutionary pressure to make vision the most complex, best-developed, and most important sense for humans and most other highly mobile creatures. Good vision helps us detect desired targets, threats, and changes in our physical environment and to adapt our behavior accordingly. So, how does the visual system accomplish this?

3.4.1: The Anatomy of Visual Sensation: How the Nervous System Processes Light

You might think of the eye as a sort of "video camera" that the brain uses to make motion pictures of the world (see Figure 3.3).

Like a camera, the eye gathers light through a lens, focuses it, and forms an image in the **retina** at the back of the eye. The lens, incidentally, turns the image left to right and upside down. (Because vision is so important, this visual reversal may have influenced the very structure of the brain, which tends to maintain this reversal in its sensory processing regions. Thus, most information from the sense organs crosses over to the opposite side of the brain. Likewise, "maps" of the body in the brain's sensory areas are typically reversed and inverted.)

But while a digital camera simply forms an electronic image, the eye forms an image that gets extensive further processing in the brain. The unique characteristic of the eye—what makes the eye different from other sense organs—lies in its ability to extract the information from light waves, which are simply a form of electromagnetic energy. The eye, then, transduces the characteristics of light into neural signals that the brain can process. This transduction happens in the retina, the light-sensitive layer of cells at the back of the eye that acts much like the light-sensitive chip in a digital camera.

And, as with a camera, things can go wrong. For example, the lenses of those who are "nearsighted" focus images short of (in front of) the retina; in those who are "farsighted," the focal point extends behind the retina. Either way, images are not sharp without corrective lenses.

The real work in the retina is performed by light-sensitive cells known as **photoreceptors,** which operate much like the tiny pixel receptors in a digital camera. These photoreceptors consist of two different types of specialized neurons—the **rods** and **cones** that absorb light energy and respond by creating neural messages (see Figure 3.4). But why are there two sorts of photoreceptors?

Because we function sometimes in near darkness and sometimes in bright light, we have evolved two types of

Figure 3.3 Structures of the Human Eye

- Muscle (for turning eye)
- Fluid (vitreous humor)
- Retina
- Fovea
- Blind spot
- Blood vessels
- Optic nerve
- Cornea
- Fluid (aqueous humor)
- Pupil
- Lens
- Iris
- Muscle (for focusing lens)
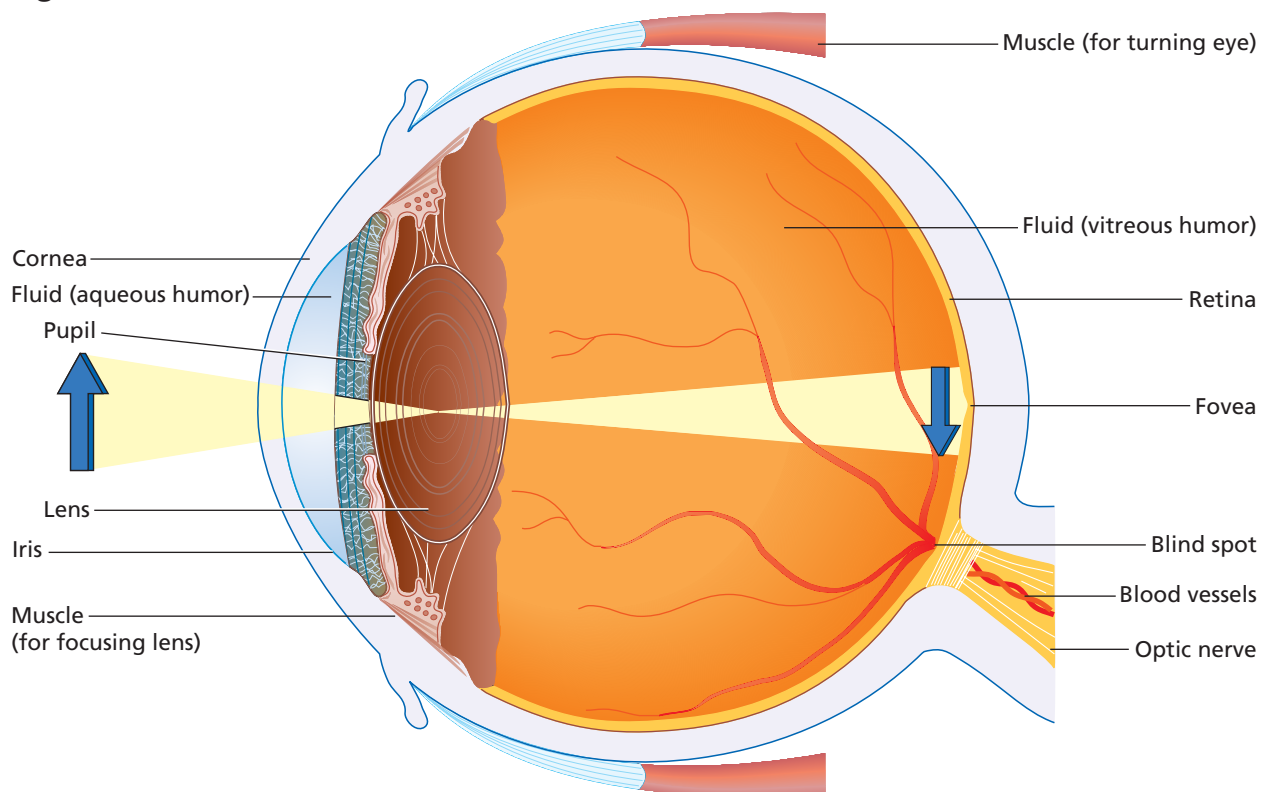
Figure 3.4 Transduction of Light in the Retina

Incoming
light stimulus

Ganglion cells

Bipolar cells

Back of retina

Rod and cone cells

Optic nerve

Outgoing nerve impulse to cortex

Eyeball

Area enlarged
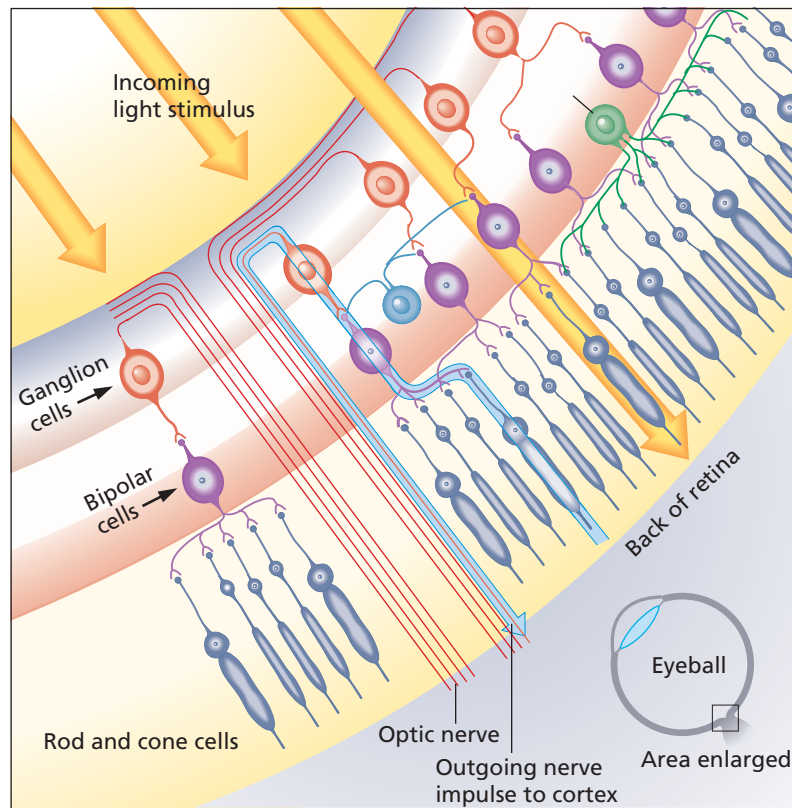
processors involving two distinct receptor cell types named for their shapes. The 125 million tiny rods "see in the dark"—that is, they detect low intensities of light at night, though they cannot make the fine distinctions that give rise to our sensations of color. Rod cells enable you to find a seat in a darkened movie theater.

Making the fine distinctions necessary for color vision is the job of the 7 million cones that come into play in brighter light. Each cone is specialized to detect the light waves we sense as blue, red, or green. In good light, then, we can use these cones to distinguish ripe tomatoes (sensed as red) from unripe ones (sensed as green). The cones concentrate in the very center of the retina, in a small region called the **fovea**, which gives us our sharpest vision. With movements of our eyeballs, we use the fovea to scan whatever interests us visually—the features of a face or, perhaps, a flower.

The retina also contains receptor cells sensitive to edges and boundaries of objects; other cells respond to light and shadow and motion (Werblin & Roska, 2007). However, there are two other important types of cells in the retina that do *not* respond directly to light. The recently discovered **Müller cells** are a funnel-shaped type of **glial cells**, which channel light through the layers of the retina to the light-sensitive rods and cones at the back of the eye (Franze and others, 2007). It is important to realize that these photore-

ceptors are as far as light penetrates into the visual system. There, the rods and the cones transduce the light into the electrochemical messages sent on to the brain through the optic nerve.

PASSING VISUAL INFORMATION ON TO THE BRAIN **Bipolar cells** collect messages from the millions of photoreceptors (rods and cones) in the retina and shuttle them on to the **retinal ganglion cells**, much as airline hubs collect passengers from many regional airports and shuttles them on to other destinations. Bundled together, the axons of the ganglion cells make up the **optic nerve**, which transports visual information from the eye to the brain (refer to Figures 3.3 and 3.4).

Strangely, there is a small area of the retina in each eye where everyone is blind, because that part of the retina has no photoreceptors. This **blind spot** is located at the point where the optic nerve exits each eye, and the result is a small hole in the visual field. You do not experience blindness there because what one eye misses is registered by the other eye, and the brain "fills in" the spot with information that matches the background. You can find your own blind spot by following the instructions in the *Do It Yourself!* box.

We should clarify that the visual impairment we call blindness can have many causes, which are usually unrelated

to the blind spot. Blindness can result, for example, from damage to the retina, cataracts that make the lens opaque, damage to the optic nerve, or damage to the visual processing areas in the brain.

Aside from the blind spot, we are all *legally blind* (in the sense of 20/200 visual acuity) in the area more than about a finger-width from the fovea (Macknik & Martinez-Conde, 2014). You can verify this right now by fixating on a word in this sentence and trying to read something more than a word or two on either side, but without moving your eyes. Nevertheless, if you have good eyesight, you probably have the feeling that our entire visual field is sharp and clear. But that's just not the case. It's a trick your brain plays on you! You actually fill in the fuzziness of your visual field from memory, in part, drawing on what you *think should be there* and in part drawing on visual patterns of the scene, as you have scanned it with eye movements.

And speaking of eye movements, your eyes are continually making tiny, involuntary movements, called *microsaccades* (Martinez-Conde & Macknik, 2011). To find out what these micro-movements do for us, scientists in the 1950s did experiments in which they managed to hold images perfectly still on the retina. (They did this with a contact lens, fitted with a very, very small projector.) It turns out that images held steady in this way seemed to disappear and reappear. Recent experiments also show that, when viewing certain visual images, microsaccades can cause us to perceive motion where there is none! (See Figure 3.5.)

Figure 3.5 The Illusion of Motion

This op-art painting, *The Enigma*, by Isia Leviant, demonstrates how our continual tiny eye movements, called "microsaccades," can create the illusion of motion in a still image, where there is no real motion at all.
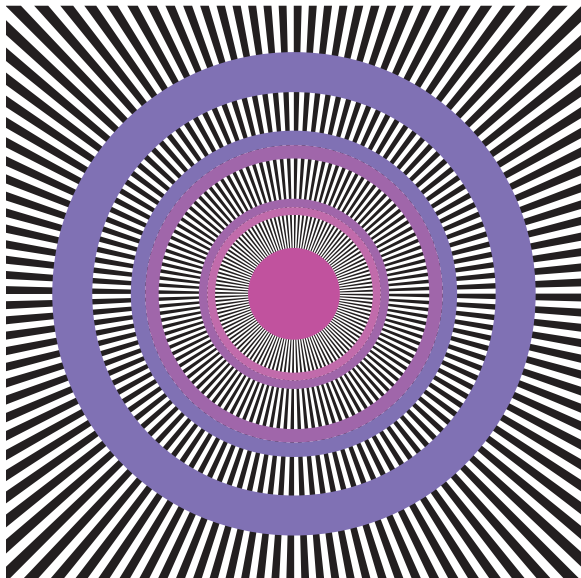
Do It Yourself!
Find Your Blind Spot

The "blind spot" occurs at the place on the retina where the neurons from the retina bunch together to exit the eyeball and form the optic nerve. There are no light-sensitive cells at this point on the retina. Consequently, you are "blind" in this small region of your visual field. The following demonstrations will help you determine where this blind spot occurs in your visual field.

Demonstration 1

Figure 3.6 Losing Your Money

Hold the image at arm's length (or, move your eye in closer, if you are viewing this on a large screen). Then close your right eye, and fix your left eye on the "bank" figure. Keep your right eye closed and bring it closer to the image, slowly. When it is between about 6 and 12 inches away (depending on the size of the image on the screen) and the dollar sign is in your blind spot, the dollar sign will disappear—but you will not see a "hole" in your visual field. Instead, your visual system fills in the missing area with information from the white background. You have "lost" your money!

Demonstration 2

Figure 3.7 Fill in the Blank

To convince yourself that the brain fills in the missing part of the visual field with appropriate background, close your right eye again and focus on the cross in the lower part of the figure. Once again, keeping the right eye closed, move closer to the image as you focus your left eye on the cross. This time, the gap in the line will disappear and will be filled in with a continuation of the line on either side. This shows that what you see in your blind spot may not really exist!

3.4.2: Processing Visual Sensation in the Brain

We *look* with our eyes, but we *see* with the brain. That is, a special brain area called the **visual cortex** creates visual images from the information imported from the eyes through the optic nerve (see Figure 3.8). As we have seen (so to speak), light from objects in the visual field projects images on the retinas of the eyes. Now please note two important things. First, the lens of the eye reverses the image

---

Figure 3.8 How Visual Stimulation Goes from the Eyes to the Brain

Note that the visual field is reversed in the brain because the lens reverses the image on the retina. (It is also upside down.) In addition, the visual pathway is constructed so that the right visual cortex "sees" the left visual field, and the left visual cortex "sees" the right visual field. (Frisby, 1980).

Left eye · Right eye
Retinal image
Optic nerve (from eye to brain)
Optic chiasma
Optic tract
Lateral geniculate nucleus (left)
Visual association cortex
Primary visual cortex

---
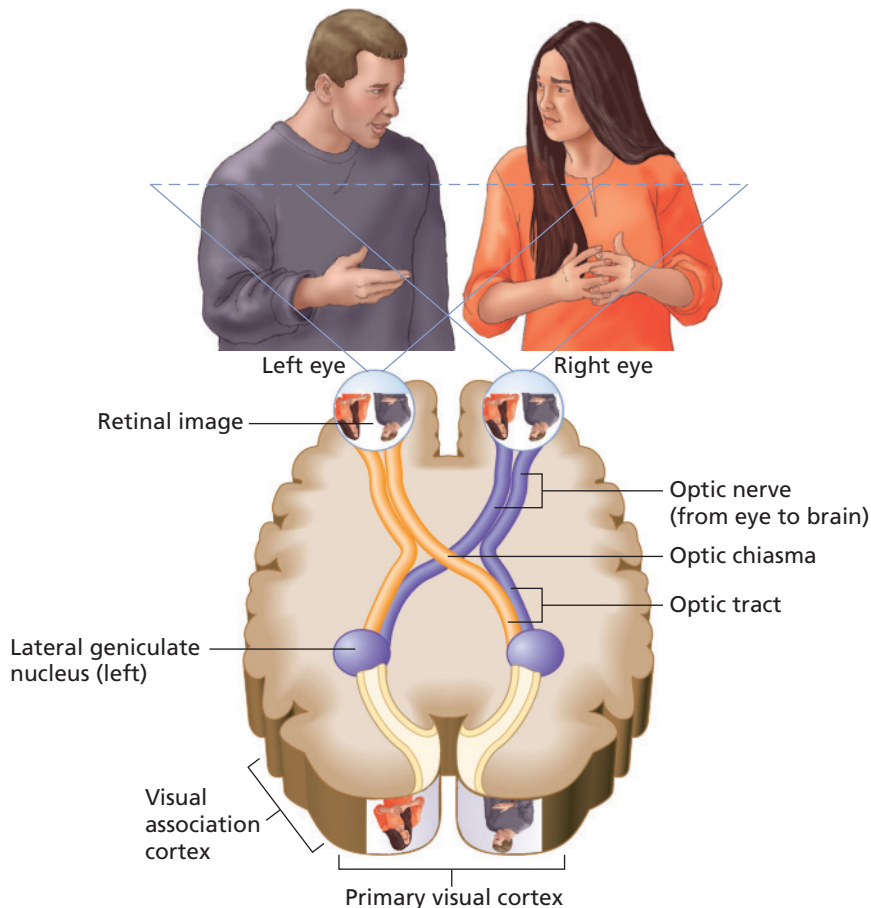
on the retina, so everything to the left falls on the right side of your retina, and everything on the right falls on the retina's left side. (Figure 3.8 will help you visualize this.) Second, the visual system splits the retinal image coming from each eye so that part of the image coming from each eye crosses over to the opposite side of the brain. (Note how branches of the optic pathway cross at the *optic chiasma*.)

As a result, objects appearing in the *left* part of the visual field *of both eyes* (the man, in Figure 3.8) are sent to the *right* hemisphere's visual cortex for processing, while objects in the *right* side of the visual field *of both eyes* (the woman, in Figure 3.8) are sent to the *left* visual cortex. In general, the right hemisphere "sees" the left visual field, while the left hemisphere "sees" the right visual field.

There in the visual cortex, the brain begins working its magic by transforming the incoming neural messages into visual sensations of color, form, boundary, and movement. Amazingly, the visual cortex also manages to take the two-dimensional patterns from each eye and assemble them into our three-dimensional world of depth (Barinaga, 1998;

Dobbins and others, 1998). With further processing, the cortex ultimately combines these visual sensations with memories, motives, emotions, and sensations of body position and touch to create a representation of the visual world that fits our current concerns and interests (de Gelder, 2000; Vuilleumier & Huang, 2009). These associations explain why, for example, you feel so strongly attracted by displays of appetizing foods if you go grocery shopping when you are hungry.

Let's return for a moment to the chapter problem and to the question, Do we "see" the world as others do? As far as sensation is concerned, we will find that the answer is a qualified "yes." That is, different people have essentially the same sensory apparatus (with the exceptions of a few individuals who, like Jonathan, cannot distinguish colors or who have other sensory deficits). Therefore, it is reasonable to assume that most people *sense* colors, sounds, textures, odors, and tastes in much the same way—although, as we will see, they do not necessarily *perceive* them in the same way. To see what we mean, let's start with the visual sensation of *brightness.*

HOW THE VISUAL SYSTEM CREATES BRIGHTNESS
Sensations of **brightness** come from the intensity or amplitude of light, determined by how much light reaches the retina (see Table 3.2).

Table 3.2 Visual Stimulation Becomes Sensation

Color and brightness are the psychological counterparts of the wavelength and intensity of a light wave. Wavelength and intensity are physical characteristics of light waves, while color and brightness are psychological characteristics that exist only in the brain.

Physical Stimulation	Psychological Sensation
Wavelength	Color
Intensity (amplitude)	Brightness

Bright light, as from the sun, involves a more intense light wave, which creates much neural activity in the retina, while relatively dim light, as from the moon, produces relatively little retinal activity. Ultimately, the brain senses brightness by the volume of neural activity it receives from the eyes.

HOW THE VISUAL SYSTEM CREATES COLOR You may have been surprised to learn that a flower or a ripe tomato, itself, has no **color**, or *hue.* Paradoxically, physical objects seen in bright light seem to have the marvelous property of being awash with color; but, as we have noted, the red tomatoes, yellow flowers, green trees, blue oceans, and multihued rainbows are, in themselves, actually quite colorless. They do reflect different wavelengths of light that we *sense* as different colors, but the light itself has no color—just wavelength. Despite the way the world appears to us, color does not exist outside the brain because color is a *sensation* that the brain creates based on the wavelength of light striking our eyes. Thus, color exists only in the mind of the viewer—a *psychological* property of our sensory experience. To understand more fully how this happens, you must first know something of the nature of light.

The eyes detect only a tiny spectrum of energy that we call *visible light.* Physicists tell us that this light is fundamentally the same as radio waves, microwaves, infrared light, ultraviolet light, X-rays, and cosmic rays. All are forms of *electromagnetic energy*. These waves differ in their wavelength (the distance they travel in making one wave cycle) as they vibrate in space, like ripples on a pond (see Figure 3.9). The light we see occupies but a tiny segment somewhere near the middle of the vast **electromagnetic spectrum**. Our only direct access to this electromagnetic spectrum lies through a small visual "window" called the **visible spectrum**. Because we have no biological receptors sensitive to the other portions of the electromagnetic spectrum, we must detect these waves through devices, such as radios and TVs, that convert the energy into signals we can sense.

Within the narrow visible spectrum, light waves of different wavelengths give rise to our sensations of different colors. Longer waves reflected from a tomato

Figure 3.9 The Electromagnetic Spectrum

The only difference between visible light and other forms of electromagnetic energy is *wavelength.* The receptors in our eyes are sensitive to only a tiny portion of the electromagnetic spectrum. (Sekuler & Blake, 1994).
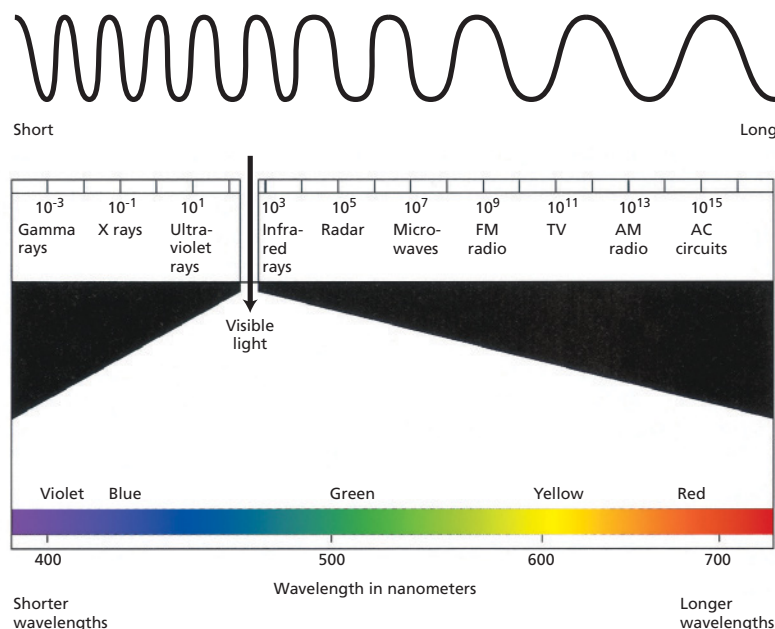
make us see red, and medium-length waves give rise to the sensations of yellow and green we see in lemons and limes. The shorter waves from a clear sky stimulate sensations of blue. Thus, the eye extracts information from the wavelength of light, and the brain uses that information to construct the sensations we see as colors (see Table 3.2).

Remarkably, our visual experiences of color, form, position, and depth are based on processing the stream of visual sensory information in different parts of the cortex. Colors themselves are realized in a specialized area, where humans are capable of discriminating among about 5 million different hues. It was damage in this part of the cortex that shut down Jonathan's ability to see colors. Other nearby cortical areas take responsibility for processing information about boundaries, shapes, and movements.

TWO WAYS OF SENSING COLORS   Even though color is realized in the cortex, color processing begins in the retina. There, three different types of cones sense different parts of the visible spectrum—light waves that we sense as red, green, and blue. This three-receptor explanation for color vision is known as the **trichromatic theory**, and for a time it was considered to account for color vision completely. We now know that the trichromatic theory best explains the initial stages of color vision in the cone cells.

Another explanation, called the **opponent-process theory**, better explains negative **afterimages** (see the Do It Yourself! box), phenomena that involve *opponent*, or complementary, colors. According to the opponent-process theory, the visual system processes colors, from the bipolar cells onward, in complementary pairs: red–green or yellow–blue. Thus, the sensation of a certain color, such as red, inhibits, or interferes with, the sensation of its complement, green. Taken together, the two theories explain two different aspects of color vision involving the retina and visual pathways. While all that may sound complicated, here is the take-home message:

> The trichromatic theory explains color processing in the cones of the retina, while the opponent-process theory explains what happens in the bipolar cells and beyond.

COLOR BLINDNESS   Not everyone sees colors in the same way, though. Some people are born with a deficiency in distinguishing colors—usually as a result of a genetic defect in the color-sensing cones of the retina. (Note, however, that Jonathan's color blindness was caused by damage to the color-processing areas in the brain.) The incidence varies among racial groups (highest in Whites and lowest in Blacks). Overall about 8% of males in the United States are affected. Women rarely have the condition.

At the extreme, complete **color blindness** is the total inability to distinguish colors. More commonly, people
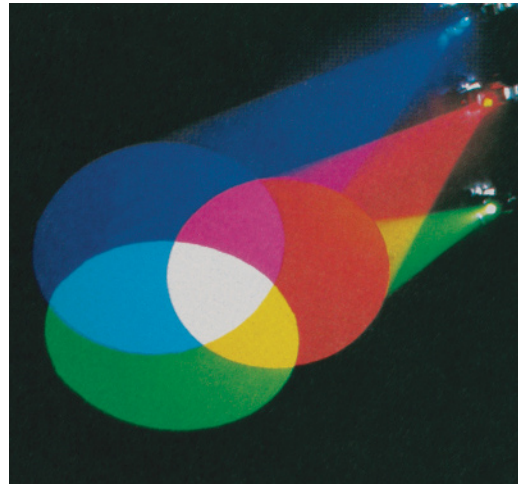
The combination of any two primary colors of light yields the complement of a third color. The combination of all three wavelengths produces white light. (The mixture of pigments, as in print, works differently, because pigments are made to absorb some wavelengths of light falling on them.)

merely have a color weakness that causes minor problems in distinguishing colors, especially under low-light conditions. People with one form of color weakness can't distinguish pale colors, such as pink or tan. Most color weakness or blindness, however, involves a problem in distinguishing red from green, especially at weak saturations. Those who confuse yellows and blues are rare, about one or two people per thousand. Rarest of all are those who see no color at all but see only variations in brightness. In fact, only about 500 cases of this total color blindness have ever been reported—including Jonathan I., whom we met at the beginning of this chapter. To find out whether you have a deficiency in color vision, look at Figure 3.10. If you see the

Figure 3.10 The Ishihara Color Blindness Test

Someone who cannot discriminate between red and green hues will not be able to identify the number hidden in the figure. What do you see? If you see the number 29 in the dot pattern, your color vision is probably normal.
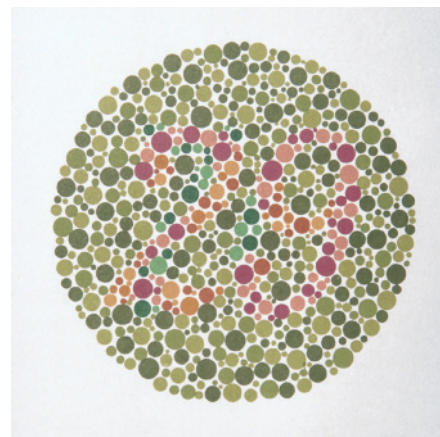
number 29 in the dot pattern, your color vision is probably normal. If you see something else, you probably have a color weakness or color blindness.

Do It Yourself!
The Amazing Afterimage

After you stare at a colored object for a while, ganglion cells in your retina will become fatigued, causing an interesting visual effect. When you shift your gaze to a blank, white surface, you can "see" the object in complementary colors—as a visual afterimage. The "phantom flag" demonstration will show you how this works. Stare at the dot in the center of the green, black, and orange flag for at least 30 seconds. Take care to hold your eyes steady and not to let them scan over the image during this time. Then quickly shift your gaze to the center of a sheet of white paper or to a light-colored blank wall. What do you see? Have your friends try this, too. Do they see the same afterimage? (The effect may not be the same for people who are color blind.)

Figure 3.11 The Flag in Complementary Colors
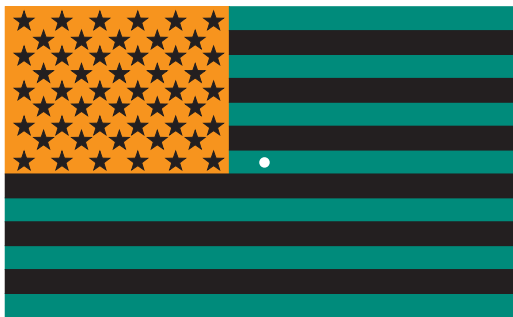
Afterimages may be negative or positive. Positive afterimages are caused by a continuation of the receptor and neural processes following stimulation. They are brief. An example of positive afterimages occurs when you see the trail of a sparkler twirled by a Fourth of July reveler. Negative afterimages are the opposite or the reverse of the original experience, as in the flag example. They last longer. Negative afterimages operate according to the opponent-process theory of color vision, which involves ganglion cells in the retina and the optic nerve. Apparently, in a negative afterimage, the fatigue in these cells produces sensations of a complementary color when they are exposed to white light.

3.5: Hearing

Objective: **Explain how the auditory system produces sound.**

Imagine how your world would change if your ability to hear were suddenly diminished. You would quickly realize that hearing, like vision, provides you with the ability to locate objects in space, such as the source of a voice calling your name. In fact, hearing may be even more important than vision in orienting us toward distant events. We often hear things, such as footsteps coming up behind us, before we see the source of the sounds. Hearing may also tell us of events that we cannot see, including speech, music, or an approaching car.

However, there is more to hearing than its function. Accordingly, we will look a little deeper to learn *how* we hear. In the next few pages, we will review what sensory psychologists have discovered about how sound waves are produced, how they are sensed, and how these sensations of sound are interpreted.

3.5.1: The Physics of Sound: How Sound Waves Are Produced

If Hollywood gave us an honest portrayal of exploding spaceships or planets, there would be absolutely no sound! In space, there is no air or other medium to carry sound waves, so if you were a witness to an exploding star, the experience would be eerily silent. On Earth, the energy of exploding objects, such as firecrackers, transfers to the surrounding medium—usually air—in the form of sound waves. Essentially the same thing happens with rapidly vibrating objects, such as guitar strings, bells, and vocal cords, as the vibrations push the molecules of air back and forth. The resulting changes in pressure spread outward in the form of sound waves that can travel 1,100 feet per second.

The purest tones are made by a tuning fork (see Figure 3.12). When struck with a mallet, a tuning fork produces an

Figure 3.12 Sound Waves

Sound waves produced by the vibration of a tuning fork create waves of compressed and expanded air.
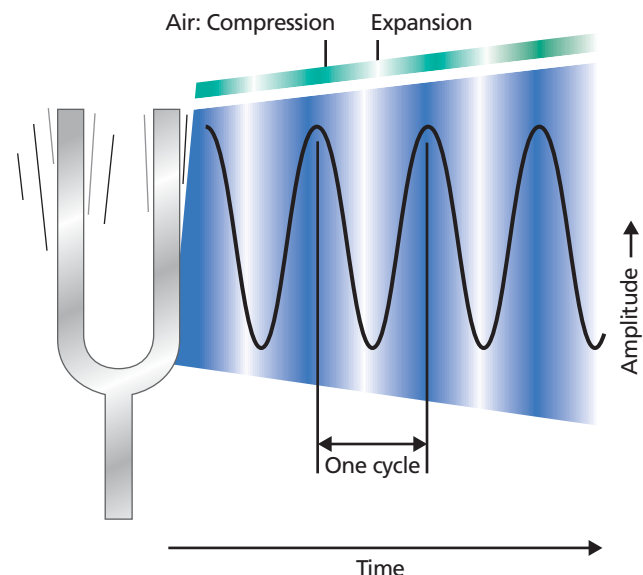
extremely clean sound wave that has only two characteristics, **frequency** and **amplitude**. These are the two physical properties of any sound wave that determine how it will be sensed by the brain.

Frequency refers to the number of vibrations or cycles the wave completes in a given amount of time, which in turn determines the highness or lowness of a sound (the *pitch*). Frequency is usually expressed in *cycles per second (cps)* or *hertz (Hz).* Amplitude measures the physical strength of the sound wave (shown in graphs as the height of the wave); it is defined in units of sound pressure or energy. When you turn down the volume on your music system, you are decreasing the amplitude of the sound waves emerging from the speakers or ear buds.

3.5.2: Sensing Sounds: How We Hear Sound Waves

Much like vision, the psychological sensation of sound requires that waves be transduced into neural impulses and sent to the brain. This happens in four steps:

WATCH How Hearing Works

The process of hearing in a human ear animation can be viewed at: https://www.youtube.com/watch?v=MXt_gX2Srgo

1. **Airborne sound waves are relayed to the inner ear.** In this initial transformation, vibrating waves of air enter the outer ear (also called the *pinna*) and move through the ear canal to the *eardrum*, or **tympanic membrane** (see Figure 3.13). This tightly stretched sheet of tissue transmits the vibrations to three tiny bones in the middle ear: the *hammer*, *anvil*, and *stirrup*, named for their shapes. These bones pass the vibrations on to the primary organ of hearing, the **cochlea**, located in the inner ear.

2. **The cochlea focuses the vibrations on the basilar membrane.** Here in the cochlea, the formerly airborne sound wave becomes "seaborne," because the coiled tube of the cochlea is filled with fluid. As the bony stirrup vibrates against the *oval window* at the base of the cochlea, the vibrations set the fluid into wave motion, much as a submarine sends a sonar "ping" through the water. As the fluid wave spreads through the cochlea, it causes vibration in the **basilar membrane**, a thin strip of hairy tissue running through the cochlea.

3. **The basilar membrane converts the vibrations into neural messages.** The swaying of tiny hair cells on the vibrating basilar membrane stimulates sensory nerve endings connected to the hair cells. The excited neurons, then, transform the mechanical vibrations of the basilar membrane into neural activity.

4. **Finally, the neural messages travel to the auditory cortex in the brain.** Neural signals leave the cochlea in a bundle of neurons called the *auditory nerve.* The neurons from the two ears meet in the brain stem, which passes the auditory information to both sides of the brain. Ultimately, the signals arrive in the *auditory cortex* of the brain's **temporal lobe** for higher-order processing.

If the auditory system seems complicated, you might think of it as a sensory "relay team." Sound waves are first funneled in by the outer ear, then handed off from the eardrum to bones in the middle ear. These bones then hand off their mechanical vibrations to the cochlea and basilar membrane in the inner ear, where they finally become neural signals, which are, in turn, passed along to the brain. This series of steps transforms commonplace

---

Figure 3.13 Structures of the Human Ear

Sound waves channeled by the ear vibrate the *tympanic membrane*, which passes vibrations to the *hammer*, *anvil*, and *stirrup* bones in the middle ear and on to the *oval window* and to fluid in the *cochlea*. There, hair cells along the *basilar membrane* respond by sending auditory messages to the brain.
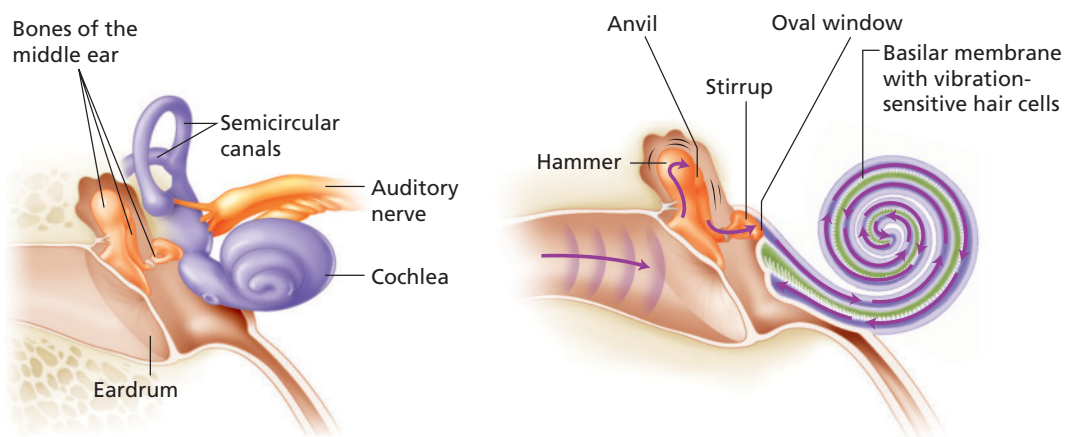
vibrations into experiences as exquisite and varied as music, doorbells, whispers, and shouts—and psychology lectures.
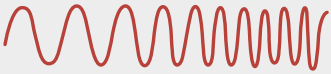
3.5.3: Psychological Qualities of Sound: How We Identify Pitch, Loudness, and Timbre

No matter where they come from, sound waves—like light waves—have only two physical characteristics: frequency and amplitude. In the following discussion, we will show you how the brain converts these two characteristics into three psychological sensations: pitch, loudness, and timbre.

SENSATIONS OF PITCH   A sound wave's frequency determines the highness or lowness of a sound—a quality known as **pitch**. High frequencies produce high-pitched sounds, and low frequencies produce low-pitched sounds, as you see in Table 3.3. As with light, our sensitivity to sound spans only a limited range of the sound waves that occur in nature. The range of human auditory sensitivity extends from frequencies as low as about 20 cps (the lowest range of a subwoofer in a good sound system) to frequencies as high as 20,000 cps (produced by the high-frequency tweeter in a high-quality audio system). Other creatures can hear sounds both higher (dogs, for example) and lower (elephants).

Table 3.3 Auditory Stimulation Becomes Sensation

Pitch and *loudness* are the psychological equivalents of *frequency* and *amplitude*, which are physical characteristics of a sound wave. Sensations of pitch and loudness exist only in the brain. Sound waves can also be complex combinations of simpler waves. We experience this complexity as *timbre*.

Physical Stimulation	Waveform	Psychological Sensation
Amplitude (intensity)		Loudness
Frequency (wavelength)		Pitch
Complexity		Timbre

How does the auditory apparatus produce sensations of pitch?

Two distinct auditory processes share the task, affording us much greater sensory precision than either could provide alone. Here's what happens:

- When sound waves pass through the inner ear, the basilar membrane vibrates (see Figure 3.12). Different frequencies activate different locations on the membrane. Thus, the pitch one hears depends, in part, on which region of the basilar membrane is receiving the greatest stimulation. This *place theory* explanation of pitch perception says that different places on the basilar membrane send neural codes for different pitches to the auditory cortex of the brain—much as keys in different places on a piano keyboard can produce different notes. It turns out that the place theory accounts mainly for our ability to hear high tones—above about 1,000 Hz (cycles per second).

- Neurons on the basilar membrane respond with different firing rates to different sound wave frequencies, much as guitar strings vibrating at different frequencies produce different notes. And so, the rate of firing provides another code for pitch perception in the brain. This *frequency theory* explains how the basilar membrane deals with frequencies below about 5,000 Hz.

- Between 1,000 and 5,000 Hz, hearing relies on both place and frequency.

What is so special about the range of 1,000 to 5,000 Hz? This interval spans the upper frequency range of human speech, which is crucial for discriminating the high-pitched sounds that distinguish consonants, such as p, s, and t. These are the subtle sounds that allow us to distinguish among many common words, such as *pie*, *sigh*, and *tie*. Coincidentally, the auditory canal is specially shaped to amplify sounds within this speech range.

SENSATIONS OF LOUDNESS   Much as the intensity of light determines brightness, the physical strength or amplitude of a sound wave determines **loudness**, as shown in Table 3.3. More intense sound waves (a shout) produce louder sounds, while we experience sound waves with small amplitudes (a whisper) as soft. *Amplitude*, then, refers to the *physical characteristics* of a sound wave, while *loudness* is a *psychological sensation*.

Because we can hear sound waves across a great range of intensity, the loudness of a sound is usually expressed as a ratio rather than an absolute amount. More specifically, sound intensity is expressed in units called decibels (dB). Figure 3.14 shows the levels of some representative natural sounds in decibel units.

SENSATIONS OF TIMBRE   The bark of a dog, a toot of a train whistle, the wail of an oboe, the clink of a spoon in a cup—all sound distinctively different, not just because they have different pitches or loudness but because they are peculiar mixtures of tones. In fact, most natural sound waves are mixtures rather than pure tones, as shown in

Figure 3.14 Intensities of Familiar Sounds

dB	
180	Rocket launch (from 150 ft)
—	
140	Jet plane take off (from 80 ft)
130	Threshold of pain
120	Loud thunder; rock band
—	Twin-engine airplane take off
100	Inside subway train
—	Hearing loss with prolonged exposure
80	Inside noisy car
—	Inside quiet car
60	Normal conversation
—	Normal office
40	Quiet office
—	Quiet room
20	Soft whisper (5 ft)
0	Absolute hearing threshold (for 1000-Hz tone)

dB
Decibel
level

Figure 3.15. This complex quality of a sound wave is known as **timbre** (pronounced TAM-b′r). Timbre is the property that enables you to recognize a friend's voice on the phone or distinguish between versions of the same song sung by different artists.

3.5.4: Why You Like the Music You Like

It has to do with familiarity. A new brain-imaging study shows that, when you hear a riff that sounds like another tune you like, the *nucleus accumbens*, situated near the center of your brain, delivers a little squirt of *dopamine*, the "feel good" neurotransmitter, to a brain region that generates sensations of reward (Salimpoor and others, 2013). Actually, it's a little more complicated than that. Also

Figure 3.15 Waveforms of Familiar Sounds

Each sound is a distinctive combination of several pure tones. (Miller, 1916/1922).

Flute

Clarinet

Human voice

Explosion

Middle C on the piano

involved are the auditory cortex, which analyzes the musical pattern and familiarity, along with emotional processing regions in the **limbic system**, which judge your emotional response to the music.

Lead experimenter Valorie Salimpoor says that it doesn't matter whether a new piece is rock, blues, classical, or hip-hop—the brain tries to make sense of it in terms of music with which you are already familiar. That is, the brain tries to find a pattern and predict how the music will play out. If you haven't heard anything like it before, your brain probably won't predict the pattern, and you probably won't get your squirt of dopamine—and so won't relate to the music.

3.5.5: Hearing Loss

Aging and exposure to loud noises commonly lead to loss of hearing acuity, especially for high-frequency sounds so crucial for understanding speech. If you think about the tiny difference between the sounds *b* and *p*, you can see why speech perception depends so heavily on high-frequency sounds. But hearing loss is not always the result of aging. It can come from diseases, such as mumps, that may attack the auditory nerves. And it can result from exposure to loud noises (see Figure 3.15), such as gunshots, jet engines, or loud music, that damage the hair cells in the cochlea.

Figure 3.16 Cochlear Implants

A wire carries sound information from an external receiver through the skull and directly to the cochlea, allowing some people with severe hearing loss to enjoy sound again.

Retrieved from: Wikipedia

Sound processor
Internal implant
Hearing nerve
Cochlea
Electrode
Cochlear implant
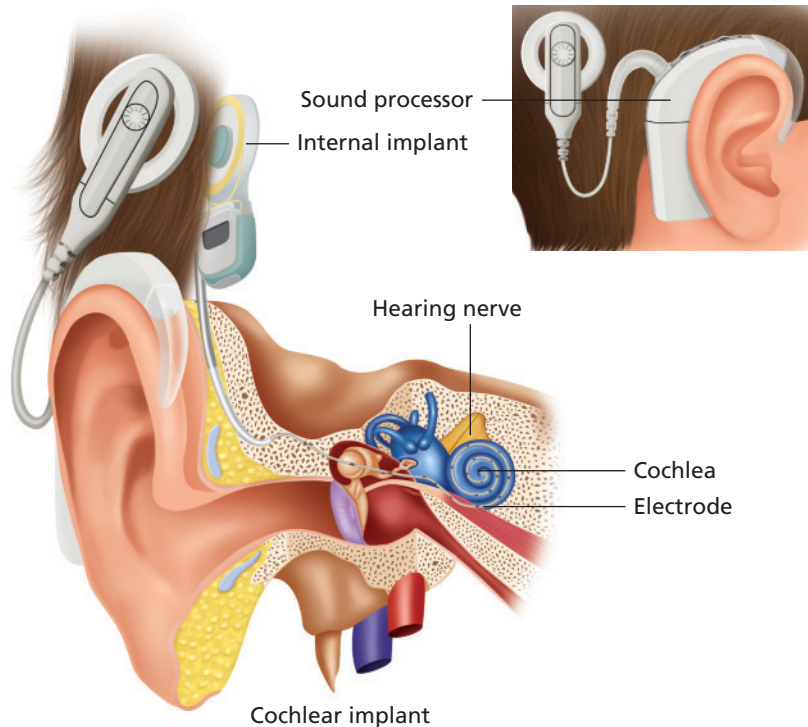
High-tech hearing devices are now available to those with partial hearing loss. Hearing aids have become smaller and more sophisticated. One very helpful development involves a wire "loop" that can be built into auditoriums, taxicabs, or nearly any other location—by which sounds are broadcast directly to hearing aids equipped with a "T-coil" receiver. Such arrangements are common in Europe, but have only recently become available in the United States (Munsey, 2011).

A surgical option, known as a cochlear implant, restores some hearing for people with severe hearing loss but a functional auditory nerve. The cochlear implant itself is a wire threaded into the cochlea, where it stimulates the auditory nerve directly with electrical impulses. People who have received the implant report that the sound is not the same as normal hearing. Often, however, it enables them to understand speech and even listen to music—impossibilities for them before the operation (National Institutes of Health, 2014).

3.5.6: Similarities of Auditory and Visual Sensations

Earlier, we discussed how visual information is carried to the brain by the optic nerve in the form of neural impulses. Now we find that, in a similar fashion, auditory information is also conveyed to the brain as neural signals—but by a different pathway and to a different location in the brain. Please note the similarity in the ways vision and hearing make use of frequency and amplitude information found in light and sound waves.

But why do we "see" visual information and "hear" auditory information? As our Core Concept 3.2 suggested, the answer lies in the region of the cortex receiving the neural message—not on some unique quality of the message itself. In brief, different regions of the brain, when activated, produce different sensations.

3.6: Comparing Vision, Hearing, and Other Senses

Objective: Explain how the senses of body position, movement, smell, taste, touch, and pain work. Describe the similarities to vision and hearing.

Of all our senses, vision and hearing have been studied the most. However, our survival and well-being depend on other senses, too. So, to conclude this discussion of sensation, we will briefly review the processes involved in our sense of body position and movement, smell, taste, the skin senses, and pain (see Table 3.4).

Table 3.4 Fundamental Features of the Human Senses

Sense	Stimulus	Sense Organ	Receptor	Sensation
Vision	Light waves	Eye	Rods and cones of retina	Colors, brightness, patterns, motion, textures
Hearing	Sound waves	Ear	Hair cells of the basilar membrane	Pitch, loudness, timbre
Skin senses	External contact	Skin	Nerve endings in skin	Touch, warmth, cold
Smell	Volatile substances	Nose	Hair cells of olfactory epithelium	Odors
Taste	Soluble substances	Tongue	Taste buds of tongue	Flavors
Pain	Many intense or extreme stimuli: temperature, chemicals, mechanical stimuli, etc.	Net of pain fibers all over the body	Nociceptors	Acute pain, chronic pain
Kinesthetic and vestibular senses	Body position, movement, and balance	Semicircular canals, skeletal muscles, joints, tendons	Hair cells in semicircular canals; neurons connected to skeletal muscles, joints, and tendons	Position of body parts in space

You will note that each gives us information about a different aspect of our internal or external environment. Yet each operates on similar principles. Each transduces physical stimuli into neural activity, and each is more sensitive to change than to constant stimulation. And, as was the case with vision and hearing, each of these senses is distinguished by the type of information it extracts and by the specialized regions of the brain devoted to it. Finally, the senses often act in concert, as when we see a lightning strike and hear the ensuing clap of thunder or when the sensation we call "taste" really encompasses a combination of flavor, odor, sight, and texture of food. Other common sensory combinations occur in sizzling steaks, fizzing colas, and bowls of Rice Krispies.

3.6.1: Senses of Position and Movement

To act purposefully and gracefully, we need constant information about the position of our limbs and other body parts in relation to each other and to objects in the environment. Without this information, even our simplest actions would be hopelessly uncoordinated. (You have probably had just this experience when you tried to walk on a leg that had "gone to sleep.") The physical mechanisms that keep track of body position, movement, and balance actually consist of two different systems, the **vestibular sense** and the **kinesthetic sense**.

The *vestibular sense* is the body position sense that orients us with respect to gravity. It tells us the posture of our bodies—whether straight, leaning, reclining, or upside down. The vestibular sense also tells us when we are moving or how our motion is changing. The receptors for this information are tiny hairs (much like those we found in the basilar membrane) in the *semicircular canals* of the inner ear (refer to Figure 3.13). These hairs respond to our movements by detecting corresponding movements in the fluid of the semicircular canals. Disorders of this sense can cause extreme dizziness and disorientation.

The *kinesthetic sense*, (or *kinesthesis*), the other sense of body position and movement, keeps track of body parts relative to each other. Your kinesthetic sense makes you aware of crossing your legs, for example, and tells you which hand is closer to your cell phone when it rings. Kinesthesis provides constant sensory feedback about what the muscles in your body are doing during motor activities, such as whether to continue reaching for your cup of coffee or to stop before you knock it over (Turvey, 1996).
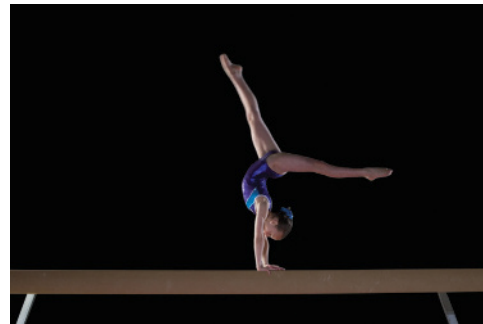
Gymnasts and dancers rely on their vestibular and kinesthetic senses to give them information about the position and movement of their bodies.

Receptors for kinesthesis reside in the joints, muscles, and tendons. These receptors, as well as those for the vestibular sense, connect to processing regions in the brain's **parietal lobes**—which help us make a sensory "map" of the spatial relationship among objects and events. This processing usually happens automatically and effortlessly, outside of conscious awareness, except when we are deliberately learning the movements for a new physical skill, such as swinging a golf club or playing a musical instrument.

3.6.2: The Sense of Smell

Smell, or **olfaction**, serves a protective function by sensing the odor of possibly dangerous food or, for some animals,

the scent of a predator. We humans seem to use the sense of smell primarily in conjunction with taste to locate and identify calorie-dense foods, avoid tainted foods, and, it seems, to identify potential mates—a fact capitalized on by the perfume and cologne industry (Benson, 2002; Martins and others, 2005; Miller & Maner, 2010).

Many animals take the sense of smell a step farther by exploiting it for communication. For example, insects such as ants and termites and vertebrates such as dogs and cats communicate with each other by secreting and detecting odorous signals called **pheromones**—especially to signal not only sexual receptivity but also danger, territorial boundaries, food sources, and family members. This sort of communication also happens, to a more limited extent, in humans, although the identification of the exact chemicals involved has proved difficult (Blum, 2011). The effect was first suggested in a famous paper by Martha McClintock (1971), showing that women synchronize their menstrual cycles, when they live together for several months, as in college dormitories—even though she was unable to identify the chemical agent responsible. Subsequent research has shown that babies are attuned to the scent from articles of clothing worn by their mothers. Other studies have found that people can distinguish samples of sweat taken from volunteers who watched horror movies from samples taken from those watching comedies (Zhou & Chen, 2009). And men who sniffed drops of women's tears had a sudden drop in their testosterone level, as well as reporting diminished sexual interest (Gelstein and others, 2011). Logically, the signals in

these studies must be pheromone chemicals, but the substances involved remain a mystery.

THE BIOLOGY OF OLFACTION Biologically, the sense of smell begins with chemical events in the nose. There, odors (in the form of airborne chemical molecules) interact with receptor proteins associated with specialized nerve cells (Axel, 1995; Turin, 2006). These cells, incidentally, are the body's only nerve cells that come in direct contact with the outside environment.

Odor molecules can be complex and varied. For example, freshly brewed coffee owes its aroma to as many as 600 volatile compounds (Wilson & Stevenson, 2006). More broadly, scientists have cataloged at least 1,500 different odor-producing molecules (Zimmer, 2010). Exactly how the nose makes sense of this cacophony of odors is not completely understood, but we do know that nasal receptors sense the shape of odor molecules (Foley & Matlin, 2010).

We also know that the nose's receptor cells transduce information about the stimulus and convey it to the brain's *olfactory bulbs*, located on the underside of the brain just below the frontal lobes (see Figure 3.17). There, our sensations of smell are initially processed and then passed on to many other parts of the brain (Mori and others, 1999). Unlike all the other senses, smell signals are *not* relayed through the thalamus, suggesting that smell has very ancient evolutionary roots.

THE PSYCHOLOGY OF SMELL Olfaction has an intimate connection with both emotion and memory. This

Figure 3.17 Receptors for Smell (Zimbardo & Gerrig, 1999)

Frontal lobe of cerebrum
Olfactory tract
Olfactory bulb
Olfactory nerves
Olfactory epithelium

Olfactory bulb
Olfactory (l) nerves
Connective tissue
Axon
Olfactory receptor cell
Dendrite
Olfactory hair (cilium)
Mucus layer
Substance being smelled

A. Section through head, showing the nasal cavity and the location of olfactory receptors

B. Enlarged aspect of olfactory receptors

may explain why the olfactory bulbs lie very close to, and communicate directly with, structures in the limbic system and temporal lobes that are associated with emotion and memory. Therefore, it is not surprising that both psychologists and writers have noticed that certain smells can evoke emotion-laden memories, sometimes of otherwise-forgotten events (Dingfelder, 2004a). If you think about it for a moment, you can probably recall a vivid memory "image" of the aroma associated with a favorite food—perhaps fresh bread or a spicy dish—from your childhood.

3.6.3: The Sense of Taste

Like smell, taste is a sense based on chemistry. But the similarity doesn't end there: The senses of taste and smell have a close and cooperative working relationship— so many of the subtle distinctions you may think of as flavors really come from odors. (Much of the "taste" of an onion is odor, not flavor. And when you have a cold,

you'll notice that food seems tasteless because your nasal passages are blocked.)

Most people know that our sense of taste, or **gustation**, involves four primary qualities or dimensions: sweet, sour, bitter, and salty. Less well known, however, is a fifth taste called *umami* (Chaudhari and others, 2000). Umami is the savory flavor found in protein-rich foods, such as meat, seafood, and cheese. It is also associated with monosodium glutamate (MSG), often used in Asian cuisine.

The taste receptor cells, located in the *taste buds* on the top and side of the tongue, sample flavors from food and drink as they pass by on the way to the stomach. These taste receptors cluster in small mucous-membrane projections called *papillae*, shown in Figure 3.18. Each is especially sensitive to molecules of a particular shape.

Moving beyond the receptors on the tongue, a specialized nerve "hotline" carries nothing but taste messages to specialized regions of the cortex. There, tastes are realized in the parietal lobe's somatosensory area. Conveniently, this region lies next to the patch of cortex that receives touch stimulation from the face (Gadsby, 2000).

DEVELOPMENTAL CHANGES IN TASTE   Infants have heightened taste sensitivity, which is why babies universally cringe at the bitter taste of lemon. This supersensitivity, however, decreases with age. As a result, many elderly people complain that food has lost its taste—which really means that they have lost much of their sensory ability to detect differences in the taste and smell of food. Compounding this effect, taste receptors can be easily

Figure 3.18 Receptors for Taste

A. Top view of tongue   B. Enlarged side view of papillae   C. Enlarged view of taste bud

Gustatory cell

Taste bud

Papillae
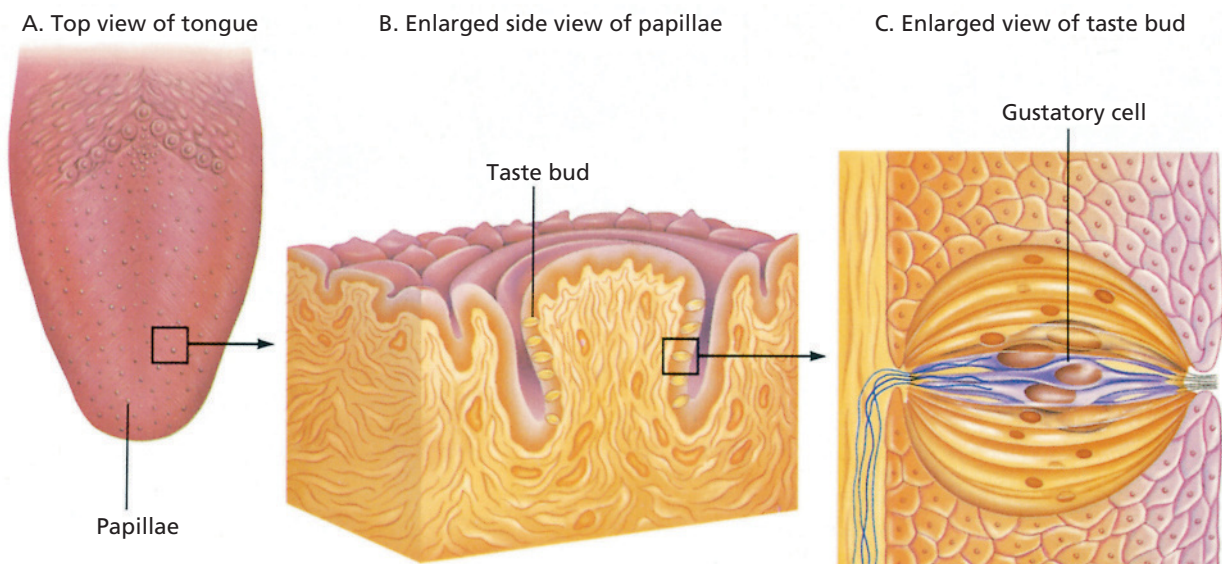
Figure 3.19 The Primary Sensory Cortex

The relative sizes of the body parts in the diagram correspond to the amount of cortex devoted to touch sensation in each part of the body.

Primary
somatosensory area
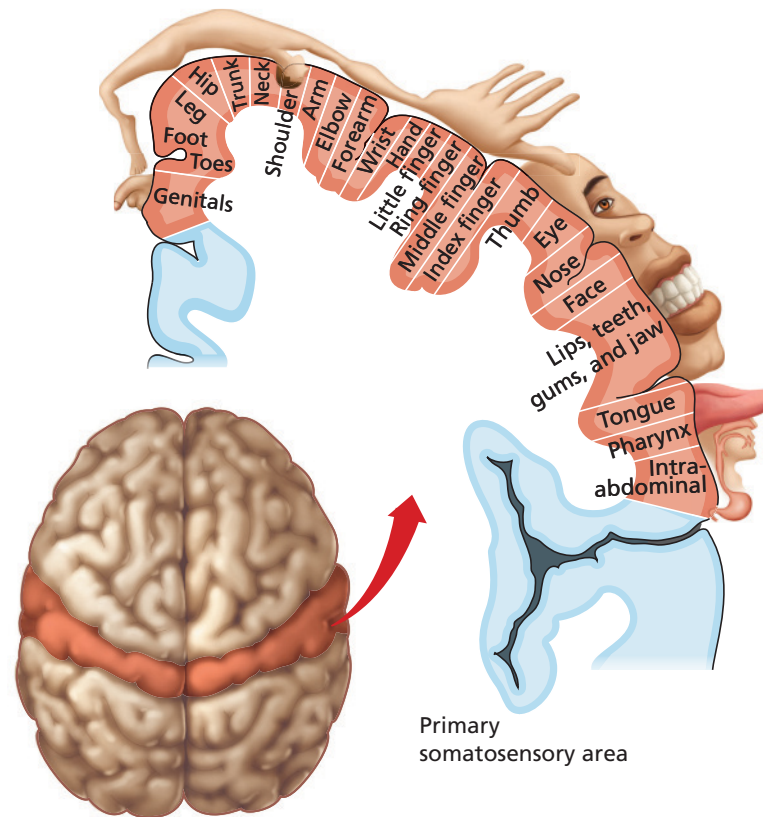
damaged by alcohol, smoke, acids, or hot foods. Fortunately, we frequently replace our gustatory receptors—as we do our smell receptors. Because of this constant renewal, the taste system boasts the most resistance to permanent damage of all our senses, and a total loss of taste is extremely rare (Bartoshuk, 1990).

THE "NEON" WORLD OF SUPERTASTERS   Individuals of any age vary in their sensitivity to taste sensations, a function of the density of papillae on the tongue (Bartoshuk, 2000, 2009; Bartoshuk and others, 1994). Those with the most taste buds are supertasters who live in a "neon" taste world relative to the rest of us—which accounts for their distaste for certain foods, such as broccoli or "diet" drinks, in which they detect a disturbingly bitter flavor (Duenwald, 2005). Is there any advantage to being a supertaster? Taste expert Linda Bartoshuk (1993) speculates that, because most poisons are bitter, supertasters have a survival advantage.

Such differences also speak to the problem with which we began the chapter—in particular, the question of whether different people sense the world in the same way. Bartoshuk's research suggests that, to the extent that the sense receptors exhibit some variation from one

person to another, so does our sensory experience of the world. This variability is not so bizarre as to make one person's sensation of sweet the same as another person's sensation of sour. Rather, the variations observed involve simply the *intensity* of taste sensations, such as the bitter flavor detected by supertasters. One big unknown, according to Bartoshuk, is whether people differ in their sensitivities to different taste sensations; for example, whether a person could be a supertaster for bitter while having only normal sensations for sweet or salt (personal communication, January 4, 2011).

On the other hand, taste researchers have detected differences in taste *preferences* between supertasters and those with normal taste sensations. In particular, supertasters more often report disliking foods that they find too sweet or too fatty. Although the significance of this remains to be determined, researchers have observed that supertasters, on the average, weigh less than their non-supertasting counterparts (Bartoshuk, 2000).

3.6.4: The Skin Senses

Consider the skin's remarkable versatility: It protects us against surface injury, holds in body fluids, and helps

regulate body temperature. The skin also contains nerve endings that, when stimulated, produce sensations of touch, pain, warmth, and cold. Like several other senses, these **skin senses** are connected to the **somatosensory cortex** located in the brain's parietal lobes.

Sensitivity to stimulation varies tremendously over the body, depending in part on the number of receptors in each area. For example, we are 10 times more accurate in sensing stimulation on our fingertips than stimulation on our backs. In general, our sensitivity is greatest where we need it most—on our face, tongue, and hands. Precise sensory feedback from these parts of the body permits effective eating, speaking, and grasping.

One important aspect of skin sensitivity—touch—plays a central role in human relationships. Through touch, we communicate our desire to give or receive comfort, support, and love (Fisher, 1992; Harlow, 1965). Touch also serves as a primary stimulus for sexual arousal in humans. And it is essential for healthy mental and physical development; the lack of touch stimulation can stunt children's mental and motor development (Anand & Scalzo, 2000).

WRITING PROMPT

Comparing the Senses

We are exposed to many kinds of stimuli which our senses cannot detect. Name one kind, and explain why we cannot detect it. (Hint: Think about the electronic or mechanical devices we use to detect information outside of our sensory "windows.")

▶
```
The response entered here will appear in the
performance dashboard and can be viewed by
your instructor.
```

Submit

3.7: Synesthesia: Sensations Across the Senses

Objective: **Explain what synesthesia teaches us about how the brain processes sensation.**

A small minority of otherwise "normal" people have a condition called **synesthesia**, which allows them to sense their worlds across sensory domains. Some actually taste shapes—so that pears may taste "round" and grapefruit "pointy" (Cytowic, 1993). Other synesthetes (including one of your authors) associate days of the week with colors—so that Wednesday may be "green" and Thursday may be "red." Their defining characteristic is sensory experiences that combine one sense with another.

Through clever experiments, V. S. Ramachandran and his colleagues have shown that the cross-sensory

sensations reported in synesthesia are real, not just metaphors (Ramachandran & Hubbard, 2001). You can take one of their tests in the accompanying *Do It Yourself!* box. Research also shows that this ability runs in families, so it probably has a genetic component.

What causes synesthesia? Apparently it can involve communication between different brain areas that process different sensations—often regions that lie close to each other in the cortex. Brain imaging studies implicate a cortical area called the *TPO*, lying at the junction of the temporal, parietal, and occipital lobes (Ramachandran & Hubbard, 2003). This region simultaneously processes information coming from many pathways. We all have some neural connections among these areas, theorizes Ramachandran, but synesthetes seem to have more than most.

The condition occurs slightly more often in highly creative people, Ramachandran asserts. And it may account for the "auras" purportedly seen around people by some mystics (Holden, 2004). But perhaps we all have some cross-sensory abilities in us, which may be why we resonate with Shakespeare's famous metaphor in *Romeo and Juliet*, "It is the east, and Juliet is the sun." We know that he was not speaking literally, of course. Rather we understand that, for Romeo—and so for us—Juliet is linked, across our senses, with light, warmth, and sensory pleasure (Ramachandran & Hirstein, 1999).

You can experience this cross-talk among different senses in the McGurk illusion, below. This illusion demonstrates how the brain tries to combine information from different senses into a coherent whole. As you will see (and hear), the brain performs a remarkable synthesis, even when the visual and auditory information conflict.

WATCH The McGurk Illusion

Watch this illusion at https://www.youtube.com/watch?feature=player_embedded&v=G-lN8vWm3m0.

This illusion illustrates cross-talk between the senses of vision and hearing—much like the communication among senses found in synesthetes.

Here's the Big Picture: A convergence of the research on synesthesia and the work on the individual senses is changing our understanding of the brain. Neuroscientists have long viewed the brain as a collection of specialized but independent "modules," each having its own function, such as sensation, perception, learning, memory, or motivation. The emerging picture is one that emphasizes the interconnections and communication among brain modules, while downplaying the independent functions of its component parts (Groeger, 2012; Shimojo & Shams, 2001; Spence, 2011).

Do It Yourself!
A Synesthesia Test

Most people will not have any trouble seeing the 5 while staring at the cross (left), although the 5 becomes indistinct when surrounded by other numbers (right). If you are a synesthete who associates colors with numbers, however, you may be able to identify the 5 in the figure on the right because it appears as a blotch of the color associated with that number. (Adapted from Ramachandran & Hubbard, 2003.)

Figure 3.20 Do You Have Synesthesia?

When you stare at the cross, can you see the "5"? In both figures?

+ 5	+ 3
	               353
	                3
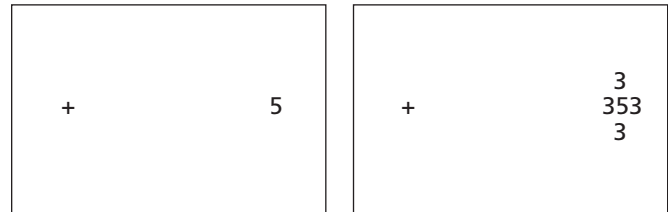
Psychology Matters

The Sense and Experience of Pain

If you have severe pain, nothing else matters. A wound or a toothache can dominate all other sensations. And if you are among the one-third of Americans who suffer from persistent or recurring pain, the experience can be debilitating and can sometimes even lead to suicide. Yet, pain is also part of your body's adaptive mechanism that makes you respond to conditions that threaten damage to your body.

Unlike other sensations, pain can arise from intense stimulation of various kinds, such as a very loud sound, heavy pressure, a pinprick, or an extremely bright light. But pain is not merely the result of stimulation. It is also affected by our moods and expectations, as you know if you were ever anxious about going to the dentist (Koyama and others, 2005).

Pain Receptors

In the skin, several types of specialized nerve cells, called **nociceptors**, sense painful stimuli and send their unpleasant messages to the central nervous system. Some nociceptors are most sensitive to heat, while others respond mainly to pressure, chemical trauma, or other tissue injury (Foley & Matlin, 2010). There are even specialized nociceptors for the sensation of itching—itself a type of pain (Gieler & Walter, 2008).

A Pain in the Brain

Even though they may seem to emanate from far-flung parts of the body, we actually feel painful sensations in the brain. At least two distinct regions process incoming pain messages (Foley & Matlin, 2010; Porreca & Price, 2009). One, involving a pathway terminating in the parietal lobe, registers the location, intensity, and the sharpness or dullness of pain. The other, a group of structures deep in the **frontal cortex**, the thalamus, and the **limbic system**, registers just how unpleasant the painful sensation is. People with damage to this second region may notice a painful stimulus but report that it does not feel unpleasant.

Phantom Limbs

One intriguing puzzle about pain concerns the mysterious sensations often experienced by people who have lost an arm or leg—a condition known as a *phantom limb*. In such cases, the amputee feels sensations—sometimes quite painful ones—that seem to come from the missing body part (Ramachandran & Blakeslee, 1998). Neurological studies show that the phantom limb sensations do not originate in damaged nerves in the sensory pathways. Nor are they purely imaginary. Rather, they arise in the brain itself—perhaps the result of the brain generating sensation when none comes from the missing limb (Dingfelder, 2007). The odd phenomenon of phantom limbs teaches us that understanding pain requires understanding not only painful sensations but also mechanisms in the brain that both process and inhibit pain.

The Gate-Control Theory

We have long known that people's interpretations of events affect whether or not stimuli are perceived as painful (Turk, 1994). So, an athlete may suffer severe injuries that cause little pain until the excitement of the contest is over. Conversely, people suffering chronic pain may get relief from **placebos** ("sugar pills") or other sham treatments, when they think the treatments are real.

The **gate-control theory** of pain is our best explanation for these mind-over-body phenomena (Melzack & Wall, 1965, 1983). To understand how this works, remember that painful sensations rush toward the brain from specialized neurons called nociceptors that are sensitive to intense stimuli or injury. From the nociceptors, most pain signals travel on a priority pathway in the spinal cord to the brain. It is in the spinal pathway that pain can be blocked or facilitated by opening or closing a neural "gate" in the pain pathway. This can be done by a "top-down" message from the brain, produced by a person's emotional state or other mental distractions (Strobel and others, 2014): Think of the soldier who doesn't notice a wound in the heat of battle. Similarly, the gate can be opened and closed by hypnosis, whose effects move down from the brain to close the spinal gate. (See Fields, 2009.) Under hypnosis, the figurative gate that closes to block the pain is thought to involve special interneurons that carry messages "top-down" from the

brain to the pain pathway running up the spinal cord. "Closing the gate," then, involves signals from the brain that inhibit the incoming pain messages in the spinal pathway.

What else can close the spinal gate? Opiate pain blockers, such as morphine, also work "top-down," by initiating a cascade of inhibitory messages from special *endorphin* receptors in the brain. These inhibitory messages travel downward to "close the gate" to ascending pain messages.

There is at least one other way to close the gate on pain that operates "bottom-up" and so does *not* involve the brain. Strong stimulation from non-pain receptors, such as those involved in touch, are thought to inhibit or overpower pain messages as they ascend in parallel pathways through the spinal cord. This explains why you get pain relief when you shake your hand vigorously after hitting your finger with a hammer (Carlson, 2007). Acupuncture is believed to work in much the same manner, by sending competing "bottom-up" signals to the spinal cord.

Dealing with Pain

Wouldn't it be nice to banish the experience of pain altogether?

As tempting as that notion may be, in reality it wouldn't be nice—in fact, such a condition can be deadly. People with congenital insensitivity to pain do not feel what is hurting them, and their bodies often become scarred and their limbs deformed from injuries they could have avoided if their brains were able to warn them of danger. Because of their failure to notice and respond to tissue-damaging stimuli, these people tend to die young (Manfredi and others, 1981). In general, pain serves as an essential defense signal: It warns us of potential harm, and it helps us to survive in hostile environments and to get treatment for sickness and injury. Sometimes, however, chronic pain seems to be a disease in itself, with neurons in the pain pathways becoming hypersensitive, amplifying normal sensory stimulation into pain messages (Watkins & Maier, 2003). Research also suggests that chronic pain may, at least sometimes, arise from genes that get "turned on" in nerve-damaged tissue apparently through epigenetic changes (Buchheit and others, 2012; Marx, 2004). To deal with such problems, new "artificially epigenetic" drugs are under development: These drugs control chronic pain by mimicking the body's own epigenetic processes to shut down pain pathways (Chiechio and others, 2010).

Analgesics

What can you do if you are in pain?

Analgesic drugs, ranging from over-the-counter remedies such as aspirin and ibuprofen to prescription narcotics, such as morphine, are widely used and effective. These act in a variety of ways. As we have seen, morphine suppresses pain messages by closing the spinal gate. Aspirin acts differently, by interfering with a chemical signal produced by damaged tissue (Basbaum & Julius, 2006; Carlson, 2007). Those using pain-killing drugs should be aware of unwanted side effects, such as digestive tract or liver damage and even addiction. But studies have shown that if you must use narcotics to control severe pain, the

possibility of your becoming addicted is far less than it would be if you were using narcotics recreationally (Melzack, 1990). The reasons for this are not entirely clear, but opiates probably don't shut down the body's own opioid production in those taking them for severe pain—nor do they produce the euphoria that addicts seek.

Over a century ago, the first local anesthetic came into use: It was cocaine. Since then, procaine (brand name: Novocain) and, later, lidocaine have replaced cocaine in surgery and dentistry. More recently—in the past 20 years—research on nociceptor neurons has discovered how these chemicals work their magic, and scientists have discovered ever more promising pain killers. We now know that "firing" of the nociceptor neurons requires sodium ions to rush through channels in the cell membrane and into the neuron. Local anesthetics, such as lidocaine, block those ion channels, and so inhibit the pain signal—much like blocking the doors of a subway car would prevent passengers from entering and ultimately reaching their destination.

Psychological Techniques for Pain Control

Many people can also learn to control pain by psychological techniques, such as hypnosis, relaxation, and thought-distraction procedures (Brown, 1998). How effective are these techniques, and do they really work?

For instance, a child receiving a shot at the doctor's office might be asked to take a series of deep breaths and look away. You also may be among those for whom pain can also be modified by placebos, mock drugs made to appear as real drugs. For example, a placebo may be an injection of mild saline solution (salt water) or a pill made of sugar. Such fake drugs are routinely given to a control group in tests of new pain drugs. Their effectiveness, of course, involves the people's *belief* that they are getting real medicine (Niemi, 2009; Wager, 2005; Wager and others, 2004). It is important to note, however, that the brain's response to a placebo is much the same as that to pain-relieving drugs: closing the spinal gate. Because this **placebo effect** is common, any drug deemed effective must prove itself stronger than a placebo.

Exactly how do placebos produce their effects? Apparently, the expectation of pain relief is enough to cause the brain to release painkilling endorphins—the brain's natural "opiates." We believe this is so because brain scans show that essentially the same pain-suppression areas "light up" when patients take placebos or analgesic drugs (Petrovic and others, 2002). Further, we find that individuals who respond to placebos report that their pain increases when they take the endorphin-blocking drug *naltrexone* (Fields, 1978; Fields & Levine, 1984).

Surprisingly, the placebo effect doesn't necessarily require a placebo! In a controlled experiment, Dr. Fabrizio Benedetti and his colleagues (2005) showed that the physician's bedside manner, even without a painkilling drug, can suppress pain. For psychologists, this is an important discovery, demonstrating that the psychosocial context itself can have a therapeutic effect (Guterman, 2005).

Controlling Psychological Pain with Analgesics

We've all felt physical pain, and we've all felt emotional pain as well. Often, however, we take physical pain more seriously, sometimes thinking that emotional pain is something that we can "get over" more easily. New research, however, shows a surprising connection between physical and emotional pain. Could the two experiences actually be similar in our brains?

As it turns out, the "pain" of rejection really *is* painful! Psychologist C. Nathan DeWall and his colleagues (2010) have found that acetaminophen (the pain reliever in Tylenol) can lessen the psychological pain of social rejection. Volunteers who took acetaminophen, as compared with those taking placebos, reported far fewer feelings of social rejection in everyday life. And in a follow-up experimental study involving a computer game rigged to make players feel social rejection, fMRI scans showed that acetaminophen reduced activity in brain areas associated with social rejection and also with physical pain. Aside from the unexpected nature of the findings, what makes this research interesting is the suggestion that both physical and psychological hurts involve some of the same pain mechanisms in the brain.

Pain Tolerance

The threshold of pain varies enormously from person to person. Some people always demand Novocain from their dentist, while others may prefer dental work without the added hassle of an injection. And in the laboratory, one study found that electric shocks had to be eight times more powerful to produce painful sensations in their least-sensitive subjects as compared with their most-sensitive subjects (Rollman & Harris, 1987). Another experiment found that brain scans of people who are highly sensitive to pain show greater activation of the thalamus and the anterior cingulate cortex than in scans of those with greater pain tolerance (Coghill and others, 2003). At least part of this variation has a genetic basis (Couzin, 2006).

We should be clear on this point: There is no evidence of genetic differences in sensitivity to pain among different ethnic or racial groups, although many reports suggest that *culture* does affect how people interpret pain and respond to painful stimulation. For example, Western women often report that childbirth is an excruciatingly painful experience, while women in some cultures routinely give birth with little indication of distress. Severely wounded soldiers, too, typically need less pain medication than do civilians with comparable injuries—perhaps because of the "culture of bravery" instilled in soldiers or because a soldier knows that a wound represents a ticket out of the combat zone.

Readers should be cautioned, however, that much of the literature on cultural differences in response to pain relies far more on anecdotes than on controlled studies. Further, the scientific work that does exist in this area has frequently come to conflicting conclusions (Foster, 2006). Perhaps one of the most important influences to emerge from this work involves poverty, pain, and access to health care: Poor people are much less likely to seek medical attention until pain becomes severe.

Key Question: What Is the Relationship Between Sensation and Perception?

> **Core Concept 3.3**
>
> **Perception brings *meaning* to sensation, so perception produces an interpretation of the world, not a perfect trepresentation of it.**

Sensory signals are first transduced by the sense organs and then transmitted to specific regions of your brain for further processing as visual images, pain, odors, and other sensations. Then what? Your brain enlists its perceptual machinery to attach *meaning* to the incoming sensory information. Does a bitter taste mean poison? Does a red flag mean danger? Does a smile signify a friendly overture? Our core concept emphasizes this perceptual elaboration of sensory information.

> Perception brings meaning to sensation, so perception produces an interpretation of the world, not a perfect representation of it.

In brief, we might say that the task of perception is to organize sensation into stable, meaningful **percepts**. A percept, then, is not just a sensation but the associated meaning as well. As we describe this complex perceptual process, we will first consider how our perceptual apparatus usually manages to give us a reasonably accurate and useful image of the world. Then we will look at some illusions and other instances in which perception apparently fails spectacularly. Finally, we will examine two theories that attempt to capture the most

fundamental principles at work behind these perceptual successes and failures.

By the end of this section, you will be able to:

3.8 Describe the brain mechanisms involved in finding meaning in sensation.

3.9 List the various types of illusions, and indicate what they tell us about perception.

3.10 Compare the Gestalt theory with Helmholz's theory of perception.

3.11 Explain why we know that our perceptions do not always give us an accurate representation of our world.

3.8: Perceptual Processing: Finding Meaning in Sensation

Objective: Describe the brain mechanisms involved in finding meaning in sensation.

How does the sensory image of a person (such as the individual pictured in Figure 3.19) become the **percept** of someone you recognize? That is, how does mere sensation become an elaborate and meaningful perception? Let's begin with two visual pathways that help us identify objects and locate them in space:

1. The *what* pathway
2. The *where* pathway

3.8.1: The What and Where Pathways in the Brain

The primary visual cortex, at the back of the brain, splits visual information into two interconnected streams (Fariva, 2009; Goodale & Milner, 1992).

1. One stream flows from the visual cortex mainly to the temporal lobe, where it identifies *what* an object is and *what* the context is. (Is it a chair in the kitchen or a toilet in the bathroom?) Neuroscientists cleverly call this the **what pathway**.

2. The other stream, the **where pathway**, projects to the parietal lobe, which determines *where* an object is located in relation to your body. (Is it in front of you? Are you about to step on it?)

Evidence suggests that other senses, such as touch and hearing, also have *what* and *where* streams that

Figure 3.21 The What Pathway and Where Pathway

The what pathway (green) projects from the occipital cortex to the parietal lobe; the where pathway (purple) carries visual information to the temporal lobe.
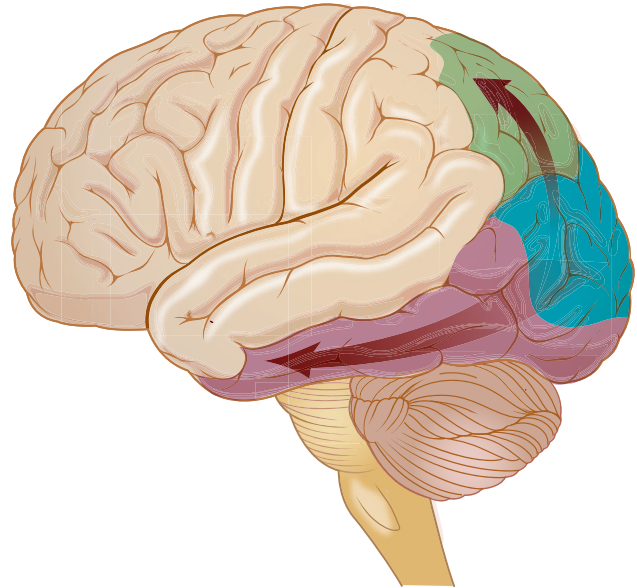
interact with those in the visual system (Rauschecker & Tian, 2000).

Curiously, we are conscious of information in the *what* pathway but not necessarily in the where pathway. This fact explains a curious phenomenon known as **blindsight**, a condition that occurs in some people with damage to the *what* pathway—damage that makes them visually unaware of objects around them. Yet if the *where* pathway is intact, blindsight patients may be able to step over objects in their path or reach out and touch objects that they claim not to see (de Gelder, 2010; Ramachandran & Rogers-Ramachandran, 2008). In this way, persons with blindsight are much like a sophisticated robot that can sense and react to objects around it even though it lacks the ability to represent them in consciousness.

WATCH Blindsight

In this video a patient blinded by damage to the visual cortex can nevertheless avoid objects as he walks down a hallway. Apparently, he uses the unconscious "where" pathway in the brain, which was not damaged. View the video at: http://blogs.scientificamerican.com/observations/2010/04/22/blindsight-seeing-without-knowing-it/

3.8.2: Objects and Scenes Seen by the Brain

What is that, and is it in the kitchen or the bathroom? Identifying an object or the context in which you find it may

seem like a trivial distinction. But how does the brain do it? Some creative fMRI studies have recently revealed a deeper insight into how such things are identified (Epstein, 2014; Epstein & MacEvoy, 2011). Brain scans show that we sometimes focus on the objects we see (a stove! a refrigerator!) and then use those objects to identify the context (We're in the kitchen!). But at other times we first make a more global interpretation of a scene (It's a photo of a bathroom!) and then use that context to identify the objects (an odd-looking toilet!).

It turns out that there are two branches of the *what* pathway. One extracts information about specific *objects* (Is that a chair or a toilet?) and another part identifies *scenes* (Is this the bathroom or the kitchen?). Thus, the *what* pathway allows us to determine both what objects are and the context in which they exist. Again, we suspect that the brain has similar dual circuitry for identifying objects and scenes by smell, touch, and hearing.

3.8.3: Feature Detectors

The deeper information travels into the brain along the *what* and *where* pathways, the more specialized processing becomes. Ultimately, specialized groups of cells in the visual pathways extract very specific stimulus features, such as an object's length, slant, color, boundary, location, and movement (Kandel & Squire, 2000). Perceptual psychologists call these cells **feature detectors**.

We know about feature detectors from animal experiments and also from cases like Jonathan's, in which brain injury or disease selectively robs an individual of the ability to detect certain features, such as colors or shapes. There is even a part of the temporal lobe—near the occipital cortex—with feature detectors that are especially sensitive to features of the human face (Carpenter, 1999).

Despite our extensive knowledge of feature detectors, we still don't know exactly how the brain manages to combine (or "bind") the multiple features it detects into a single percept of, say, a face. Psychologists call this puzzle the **binding problem**, and it may be the deepest mystery of perceptual psychology (Kandel & Squire, 2000).

We do have one tantalizing piece of this perceptual puzzle: Neuroscientists have discovered that the brain synchronizes the firing patterns in different groups of neurons that have detected different features of the same object—much as an orchestra conductor synchronizes the tempo at which all members of the ensemble play a musical piece (Buzsáki, 2006). But just how this synchronization is involved in "binding" these features together remains a mystery.

Viewers report a shimmering or moving sensation in Claude Monet's *Coquelicots*. Neuroscientists explain that the flower colors have the same level of brightness as those in the surrounding field—and so are difficult for the color-blind "where" pathway to locate precisely in space (Dingfelder, 2010).

3.8.4: Top-Down and Bottom-Up Processing

Forming a percept also seems to involve imposing a pattern on sensation. This involves two complementary processes that psychologists call:

- Top-down processing
- Bottom-up processing

In **top-down processing**, our goals, past experience, knowledge, expectations, memory, motivations, or cultural background guide our perceptions of objects—or events (see Nelson, 1993). Trying to find your car keys in a cluttered room requires top-down processing. So does searching for Waldo in the popular children's book series *Where's Waldo?* And if you skip lunch to go grocery shopping, top-down hunger signals will probably make you notice all the snack foods in the store.

In **bottom-up processing**, the characteristics of the stimulus (rather than a concept in our minds) exert a strong influence on our perceptions. Bottom-up processing relies heavily on the brain's feature detectors to sense these stimulus characteristics: Is it moving? What color is it? Is it loud, sweet, painful, pleasant smelling, wet, hot . . . ? You are doing bottom-up processing when you notice a moving fish in an aquarium, a hot pepper in a stir-fry, or a loud noise in the middle of the night.

Thus, bottom-up processing involves sending sensory data into the system through receptors and sending it "upward" to the cortex, where a basic analysis,

involving the feature detectors, is first performed to determine the characteristics of the stimulus. Psychologists also refer to this as *stimulus-driven processing* because the resulting percept is determined, or "driven," by stimulus features. By contrast, top-down processing flows in the opposite direction, with the percept being driven by some concept in the cortex—at the "top" of the brain. Because this sort of thinking relies heavily on concepts in the perceiver's own mind, it is also known as *conceptually driven processing.*

3.8.5: Perceptual Constancies

We can illustrate another aspect of perception with yet another example of top-down processing. Suppose that you are looking at a door, such as the one pictured in Figure 3.22A. You "know" that the door is rectangular, even though your sensory image of it is distorted when you are not looking at it straight-on. Your brain automatically corrects the sensory distortion so that you perceive the door as being rectangular, as in Figure 3.22B.

This ability to see an object as being the same shape from different angles or distances is just one example of a **perceptual constancy**. In fact, there are many kinds of perceptual constancies. These include *color constancy*, which allows us to see a flower as being the same color in the reddish light of sunset as in the white glare of midday. *Size constancy* allows us to perceive a person as the same size at different distances and also serves as a strong cue for depth perception. And it

was *shape constancy* that allowed us to see the door as remaining rectangular from different angles. Together, these constancies help us identify and track objects in a changing world.

3.8.6: Inattentional Blindness and Change Blindness

Sometimes we don't notice things that occur right in front of our noses—particularly if they are unexpected and we haven't focused attention on them. For example, while driving you may not notice a car unexpectedly shifting lanes. Psychologists call this **inattentional blindness** (Beck and others, 2004; Greer, 2004a). Magicians rely on it for many of their tricks (Sanders, 2009). They also rely on **change blindness**, a related phenomenon in which we fail to notice that something is different now than it was before, as when a friend changes hair color or shaves a mustache (Martinez-Conde & Macknik, 2008).

We *do* notice changes that we anticipate, such as a red light turning to green. But laboratory studies show that many people don't notice when, in a series of photographs of the same scene, a red light is replaced by a stop sign. One way this may cause trouble in the world outside the laboratory is that people underestimate the extent to which they can be affected by change blindness. This probably occurs because our perceptual systems and our attention have limits on the amount of information they can process, so our expectations coming from the "top down" cause us to overlook the unexpected.

Figure 3.22 A Door by Any Other Shape Is Still a Door

A door seen from an angle (A) presents the eye with a distorted sensory image. Nevertheless, the brain still perceives it as rectangular, as in B.

A

B
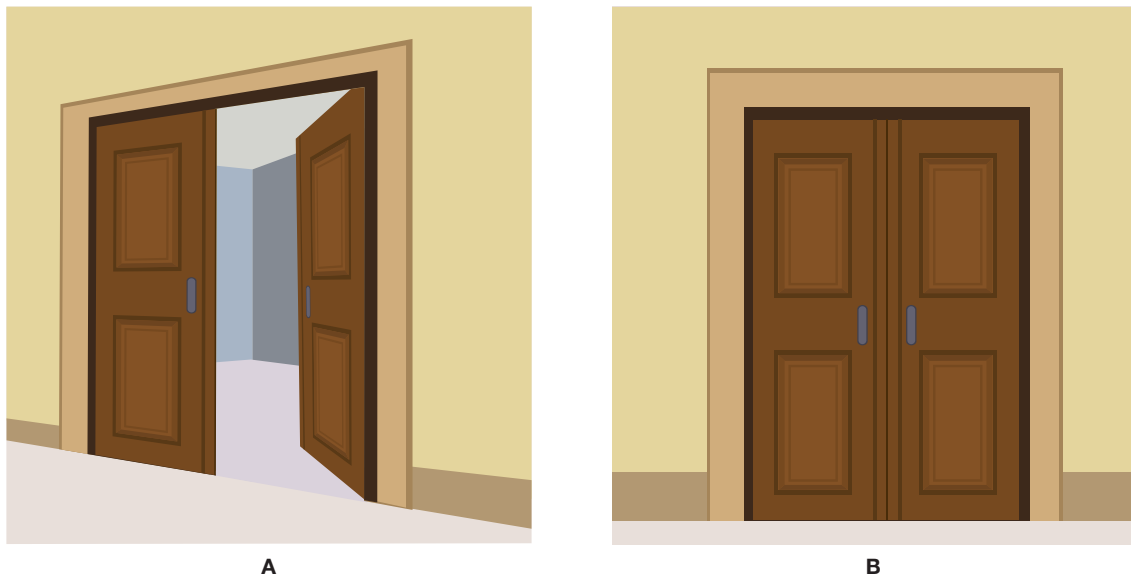
3.9: Perceptual Ambiguity and Distortion

Objective: **List the various types of illusions, and indicate what they tell us about perception.**

A primary goal of perception is to get an accurate "fix" on the world—to recognize friends, foes, opportunities, and dangers. Survival sometimes depends on accurately perceiving the environment, but the environment is not always easy to "read." We can illustrate this difficulty with the photo of black and white splotches in Figure 3.23. What is it?

Figure 3.23 An Ambiguous Picture

What is depicted here? The difficulty in seeing the figure lies in its similarity to the background.

When you eventually extract the stimulus figure from the background, you will see it as a Dalmatian dog walking toward the upper left with its head down. The dog is hard to find because it blends so easily with the background. The same problem occurs when you try to single out a voice against the background of a noisy party.

But it is not just the inability to find an image that causes perceptual problems. Sometimes our perceptions can be wildly inaccurate because we misinterpret an image—as happens with sensory and perceptual *illusions.*

3.9.1: What Illusions Tell Us About Sensation and Perception

When your mind deceives you by interpreting a stimulus pattern incorrectly, you are experiencing an **illusion**. Such illusions can help us understand some fundamental properties of sensation and perception—particularly the discrepancy between our percepts and external reality (Cohen & Girgus, 1973).

Let's first examine a remarkable bottom-up illusion that works at the level of sensation: the black-and-white Hermann grid (see Figure 3.24).

Figure 3.24 The Hermann Grid

As you stare at the center of the grid, note how dark, fuzzy spots appear at the intersections of the white bars. But when you focus on an intersection, the spot vanishes (Levine & Shefner, 2000). Why is this? The illusion, which operates at the sensory level, is explained in the text.
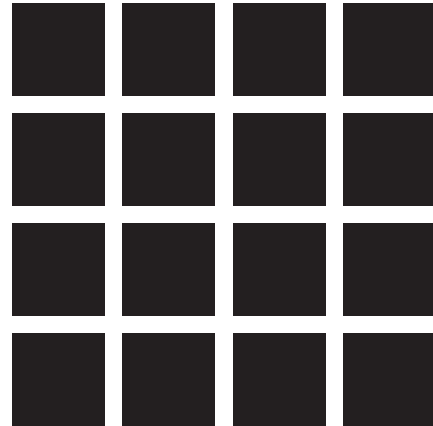
AMBIGUOUS FIGURES AND PERCEPTUAL ILLUSIONS The Hermann grid illusion arises from the way receptor cells in your visual pathways interact with each other. The firing of certain cells that are sensitive to light–dark boundaries inhibits the activity of adjacent cells that would otherwise detect the white grid lines. This inhibiting process makes you sense darker regions—the grayish areas—at the white intersections just outside your focus. Even though you know (top-down) that the squares in the Hermann grid are black and the lines are white, this knowledge cannot overcome the illusion, which operates at a more basic, sensory level.

To study illusions at the level of perception, psychologists often employ **ambiguous figures**—stimulus patterns that can be interpreted (top-down) in two or more distinct ways, as in Figure 3.25.

There you see that both the vase/faces figure and the Necker cube are designed to confound your interpretations, not just your sensations. Each suggests two conflicting meanings: Once you have seen both, your perception will cycle back and forth between them as you look at the figure. Studies suggest that these alternating interpretations may involve the shifting of perceptual control between the left and right hemispheres of the brain (Gibbs, 2001).

Another dramatic illusion, recently discovered, appears in Figure 3.26. Although it is hard to believe, the squares marked A and B are the same shade of gray. Proof appears in the right-hand image, where the vertical bars are also the same gray shade.

Perceptual psychologists respond that the effect derives from *color and brightness constancy:* our ability to see an object as essentially unchanged under different lighting conditions, from the bright noon sun to near darkness (Gilchrist, 2006). Under normal conditions, this prevents us from being misled by shadows.

Figure 3.25 Perceptual Illusions

These ambiguous figures are illusions of perceptual interpretation.

A.

Vase or faces?

B.

The Necker cube:
above or below?
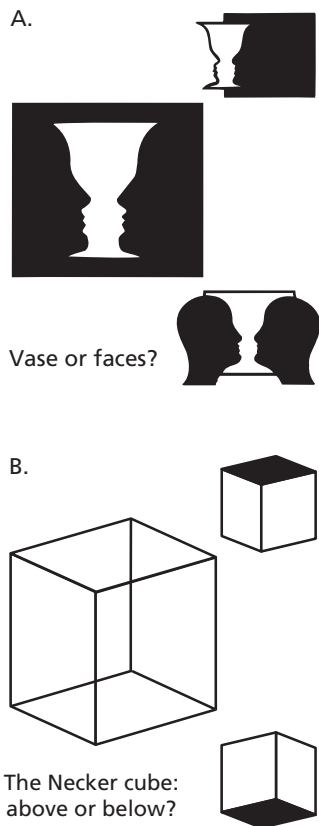
Figure 3.26 The Checkerboard Illusion

Appearances are deceiving: Squares A and B are actually the same shade of gray, as you can see on the right by comparing the squares with the vertical bars (Adelson, 2010). The text explains why this occurs.
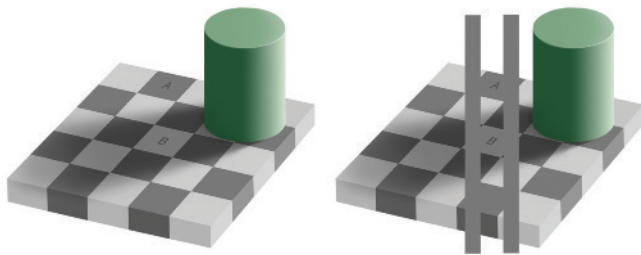
OTHER ILLUSIONS Figure 3.27 shows several other illusions that operate primarily at the level of perceptual interpretation. All are compelling, and all are controversial. Another is the Müller–Lyer illusion in Figure 3.28A, which has intrigued psychologists for more than 100 years. Disregarding the arrowheads, which of the two vertical lines in this figure appears longer? If you measure them, you will see that the vertical lines are exactly the same length. What is the explanation? Answers to that question have been offered in well over a thousand published studies, and psychologists still don't know for sure.

One explanation for the Müller–Lyer illusion says that your brain thinks it is seeing the inside and outside corners of a building in perspective. The inside corner seems to recede in

Figure 3.27 Illusions to Tease Your Brain

Each of the illusions in Figure 3.27 involves a bad "bet" made by your brain. What explanations can you give for the distortion of reality that each of these illusions produces? Are they caused by nature or nurture? The table illusion was originally developed by Roger N. Shepard and presented in his 1990 book *Mind Sights* (Freeman).

A.
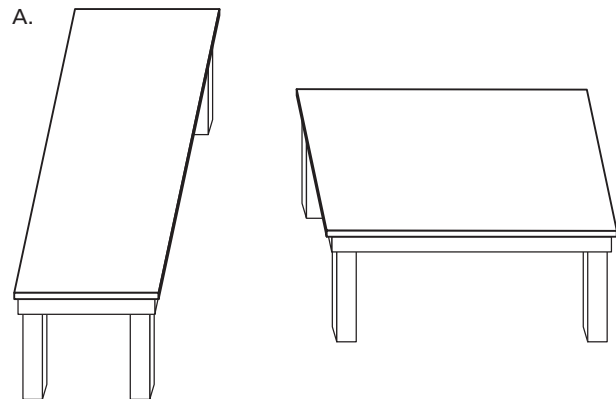
(A) The Shepard's Tables illusion, named after cognitive scientist/artist Roger Shepard, is based on size constancy—the assumption that objects in the distance (the far end of the "long" table) appear smaller than they really are.

B.
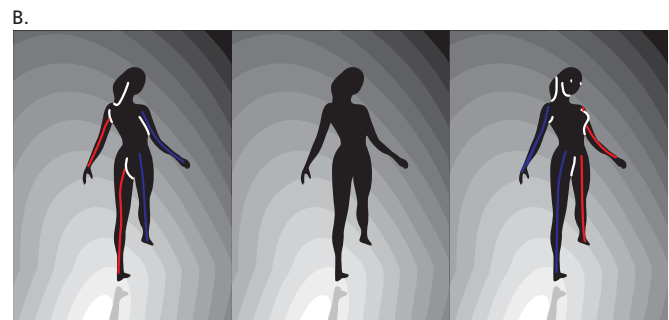
(B) The Spinning Dancer illusion relies on perceptual ambiguity. That is, the dancer in the center panel can be seen rotating in either direction. The images on the right and left will help you see her spinning both ways.

C.

D.
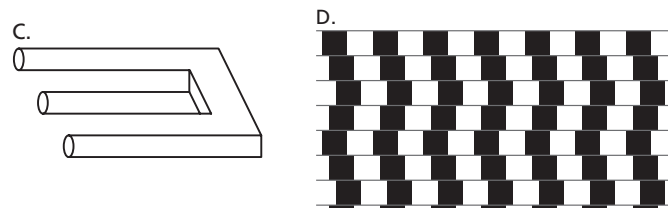
(C) The Devil's Fork is an impossible object, drawn to represent two different objects, depending on which end you are looking at. The illusion works because we assume it represents a three-dimensional object, but, in reality, it can only exist in two dimensions.

(D) The Café Wall illusion makes us think the horizontal lines slant in alternating directions. But you can see that they are parallel by placing a straightedge along the bottom of the top row. The illusion has not been fully explained, but it seems to depend on the "tiles" being slightly offset.

the distance, while the outside corner appears to extend toward us. Therefore, we judge the outside corner to be closer—and shorter. Why? When two objects make the same-size image on the retina and we judge one to be farther away than the other, we assume that the more distant one is larger.

One popular theory, combining both top-down and bottom-up factors, has gathered some support. It suggests that we unconsciously interpret the Müller–Lyer figures in Figure 3.28A as three-dimensional objects. So instead of arrowheads, we see the ends as angles that project toward or away from us like the inside and outside corners of a building or a room, as in Figure 3.28B.

Figure 3.28 The Müller–Lyer Illusion

Disregarding the arrowheads, which of the two vertical lines in this figure appears longer? The explanation for this illusion has been disputed among psychologists for over a century.

A   B
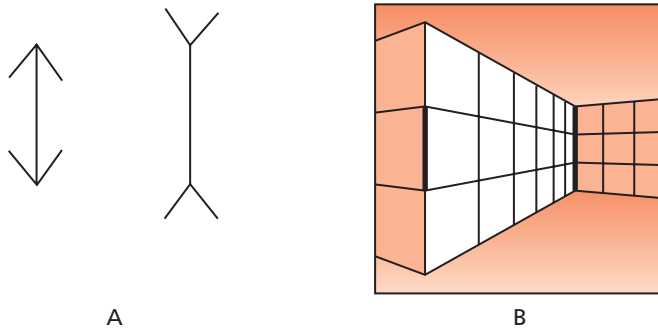
3.9.2: Illusions in the Context of Culture

But what if you had grown up in a culture with no square-cornered buildings? Would you still see one line as longer than the other in the Müller–Lyer illusion? In other words, do you have to *learn* to see the illusion, or is it "hard wired" into your brain? One way to answer such questions is through cross-cultural research. With this in mind, Richard Gregory (1977) went to South Africa to study a group of people known as the Zulus, who live in what he called a "circular culture." Aesthetically, people in that culture prefer curves to straight lines and square corners: Their round huts have round doors and windows; they till their fields along sweeping curved lines, using curved plows; the children's toys lack straight lines.

So what happened when Gregory showed them the Müller–Lyer image? Most saw the lines as nearly the same length. This suggests that the Müller–Lyer illusion is learned. A number of other studies support Gregory's conclusion that people who live in "carpentered" environments—where buildings are built with straight sides and 90-degree angles—are more susceptible to the illusion than those who (like the Zulus) live in "noncarpentered" worlds (Segall and others, 1999).

3.9.3: Applying the Lessons of Illusions

Several prominent modern artists, fascinated with the visual experiences created by ambiguity, have used perceptual illusion as a central artistic feature of their work. Consider the example shown in Figure 3.29. The effect of these paintings on us underscores the function of human

Figure 3.29 Visual Illusion in Art

perception to make sense of the world and to fix on the best interpretation we can make.

To interpret such illusions, we draw on our personal experiences, learning, and motivation. Knowing this, those who understand the principles of perception often can control their work to achieve desired effects far beyond the world of painting. Architects and interior designers, for example, create illusions that make spaces seem larger or smaller than they really are. They may, for example, make a small apartment appear more spacious when it is painted in light colors and sparsely furnished. Similarly, set and lighting designers in movies and theatrical productions purposely create visual illusions on film and on stage. So, too, do many of us make everyday use of illusion in our choices of cosmetics and clothing (Dackman, 1986). Light-colored clothing and horizontal stripes can make our bodies seem larger, while dark-colored clothing and vertical stripes can make our bodies seem slimmer. In such ways, we use illusions to distort "reality" and make our lives more pleasant.

WRITING PROMPT

Your Illusions

Describe an illusion you have experienced, and suggest one of the perceptual principles that created the illusion.

▶
```
The response entered here will appear in the
performance dashboard and can be viewed by
your instructor.
```

Submit

3.10: Theoretical Explanations for Perception

Objective: **Compare the Gestalt theory with Helmholz's theory of perception.**

The fact that most people perceive most illusions and ambiguous figures in essentially the same way suggests

that fundamental perceptual principles are at work. But what are these principles? To find some answers, we will examine two influential theories that explain how we form our perceptions: *Gestalt theory* and *learning-based inference*.

Although these two approaches may seem contradictory at first, they really emphasize complementary influences on perception. The Gestalt theory emphasizes how we organize incoming stimulation into meaningful perceptual patterns—because of the way our brains are innately "wired." On the other hand, learning-based inference emphasizes learned influences on perception, including the power of expectations, context, and culture. In other words, Gestalt theory emphasizes **nature**, and learning-based inference emphasizes **nurture**.

3.10.1: The Gestalt Theory of Perceptual Organization

You may have noticed that a series of blinking lights, perhaps on a theater marquee, can create the illusion of motion where there really is no motion. Similarly, there appears to be a white triangle in the accompanying *Do It Yourself!* box—but there really is no white triangle. And, as we have seen, the Necker cube seems to flip back and forth between two alternative perspectives—but, of course, the flipping is all in your mind.

About 100 years ago, such perceptual tricks captured the interest of a group of German psychologists, who argued that the brain is innately wired to perceive not just stimuli but also *patterns* in stimulation (Sharps & Wertheimer, 2000). They called such a pattern a *Gestalt*, the German word for "perceptual pattern" or "configuration." Thus, from the raw material of stimulation, the brain forms a perceptual whole that is more than the mere sum of its sensory parts (Prinzmetal, 1995; Rock & Palmer, 1990). This perspective became known as **Gestalt psychology**.

The Gestaltists liked to point out that we perceive a square as a single figure rather than merely as four individual lines. Similarly, when you hear a familiar song, you do not focus on the individual notes. Rather, your brain extracts the melody, which is your perception of the overall *pattern* of notes. Such examples, the Gestalt psychologists argued, show that we always attempt to organize sensory information into meaningful patterns, the most basic elements of which are already present in our brains at birth. Because this approach has been so influential, we will examine some of the Gestalt discoveries in more detail.

FIGURE AND GROUND One of the most basic of perceptual processes identified by Gestalt psychology divides our perceptual experience into **figure** and **ground**. A figure is simply the part of a pattern or image that grabs our attention. As we noted, psychologists sometimes call this a

Gestalt. Everything else becomes *ground*, the backdrop against which we perceive the figure. A melody becomes a figure heard against a background of complex harmonies, and a spicy chunk of pepperoni becomes the figure against the ground of cheese, sauce, and crust that makes up a pizza. Visually, a figure could be a bright flashing sign or a word on the background of a page. And in the ambiguous faces/vase seen in Figure 3.25A, figure and ground reverse when the faces and vase alternately "pop out" as figure.

Do It Yourself!
Figure Obscures Ground

The tendency to perceive a figure as being in front of a ground is strong. It is so strong, in fact, that you can even get this effect when the perceived figure doesn't actually exist! You can demonstrate this with an examination of Figure 3.30. (See also Ramachandran & Rogers-Ramachandran, 2010.) You probably perceive a fir-tree shape against a ground of red circles on a white surface. But, of course, there is no fir-tree figure printed on the page; the figure consists only of three solid red shapes and a black-line base. You perceive the illusory white triangle in front because the wedge-shaped cuts in the red circles seem to be the corners of a solid white triangle. To see an illusory six-pointed star, look at part B. Here, the nonexistent "top" triangle appears to blot out parts of red circles and a black-lined triangle, when in fact none of these are depicted as complete figures. Again, this demonstrates that we prefer to see the figure as an object that obscures the ground behind it. (That's why we often call the ground a "*back*ground.")

Figure 3.30 Subjective Contours

(A) A subjective fir tree; (B) a subjective six-pointed star.

A   B
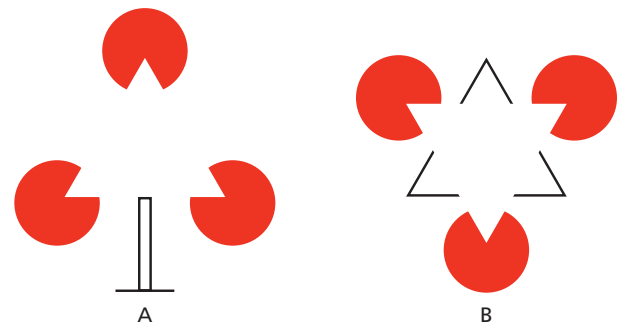
CLOSURE: FILLING IN THE BLANKS Our minds seem built to abhor a gap, as you saw in the blind-spot demonstration earlier. Note especially the illusory white triangle—superimposed on red circles and black lines. Moreover, you will note that you have mentally divided the white area into two regions, the triangle and the background. Where this division occurs, you perceive *subjective contours:* boundaries that exist not in the stimulus but only in the subjective experience of your mind.

Your perception of these illusory triangles demonstrates a second powerful organizing process identified by the Gestalt psychologists. **Closure** makes you see incomplete figures as wholes by supplying the missing segments, filling in gaps, and making inferences about potentially hidden objects. So when you see a face peeking around a corner, your mind automatically fills in the hidden parts of the face and body in your "mind's eye." In general, humans have a natural tendency to perceive stimuli as complete and balanced even when pieces are missing. (Does this ring a _____ with you?)

Incidentally, it can be rather annoying when you cannot achieve closure—especially in a situation we have all experienced: overhearing a cell phone conversation, particularly in a public place, in the midst of many other distractions. The problem is, we always try to make sense of events in our environment, but when we can hear only one side of a conversation (half of the conversational Gestalt)—even if we are trying not to listen—we can't achieve closure because we can't fill in the unheard half of the exchange. Studies show that this "halfalogue" is much more annoying than listening to a *dialogue* between two people (Emberson and others, 2010).

In the foregoing demonstrations, we have seen how the perception of subjective contours and closure derives from the brain's ability to create percepts out of incomplete stimulation. Now let us turn to the perceptual laws that explain how we group the stimulus elements that are actually present in Gestalts.

3.10.2: The Gestalt Laws of Perceptual Grouping

It's easy to see a school of fish as a single unit—as a Gestalt. But why? And how do we mentally combine hundreds of notes together and perceive them as a single melody? How do we combine the elements of color, shadow, form, texture, and boundary into the percept of a friend's face? And why have thousands of people reported seeing "flying saucers," or the face of Jesus in the scorch marks on a tortilla? That is, how do we pull together in our minds the separate stimulus elements that seem to "belong" together? This is the binding problem again: one of the most fundamental problems in psychology. As we will see, the Gestalt psychologists made great strides in this area, even though the processes by which perceptual organization works are still debated today (Palmer, 2002).

In the heyday of Gestalt psychology, of course, there were no **MRIs** or **PET** scans. Modern neuroscience didn't exist. Hence, Gestalt psychologists like Max Wertheimer (1923) had to focus on the problem of perceptual organization in a different way—with arrays of simple figures, such as you see in Figure 3.31. By varying a single factor and observing how it affected the

way people perceived the structure of the array, Wertheimer was able to formulate a set of **laws of perceptual grouping**, which he inferred were built into the neural fabric of the brain.

Figure 3.31

Gestalt Laws of Perceptual Grouping

A. Similarity   B. Proximity

C. Continuity

According to Wertheimer's **law of similarity**, we group things together that have a similar look (or sound, or feel, and so on). So in Figure 3.31A, you see that the *X*s and *O*s form distinct columns, rather than rows, because of similarity. Likewise, when you watch a football game, you use the colors of the uniforms to group the players into two teams because of similarity, even when they are mixed together during a play. You can also hear the law of similarity echoed in the old proverb "Birds of a feather flock together," which is a commentary not only on avian behavior but also on the assumptions we make about perceptual grouping. Any such tendency to perceive things as belonging together because they share common features reflects the law of similarity.

Now, suppose that, on one drowsy morning, you mistakenly put on two different-colored socks because they were together in the drawer and you assumed that they were a pair. Your mistake was merely Wertheimer's **law of proximity** (nearness) at work. The proximity principle says that we tend to group things together that are near each other, as you can see in the pairings of the *X*s with the *O*s in Figure 3.31B. On the level of social perception, your parents were invoking the law of proximity when they cautioned you, "You're known by the company you keep."

We can see the Gestalt **law of continuity** in Figure 3.31C, where the straight line appears as a single, continuous line, even though the curved line repeatedly cuts through it. In general, the law of continuity says that we prefer smoothly connected and continuous figures to disjointed ones. Continuity also operates in the realm of social perception, where we commonly make the assumption of continuity in the personality of an individual whom we haven't seen for some time. So, despite interruptions in our contact with that person, we will expect to find continuity—

to find him or her to be essentially the same person we knew earlier.

There is yet another form of perceptual grouping—one that we cannot easily illustrate here because it involves motion. But you can easily conjure up your own image that exemplifies the **law of common fate:** Imagine a school of fish, a gaggle of geese, or a uniformed marching band. When visual elements (the individual fish, geese, or band members) are moving together, you perceive them as a single Gestalt.

According to the Gestalt perspective, then, each of these examples of perceptual grouping illustrates the profound idea that our perceptions reflect innate patterns in the brain. These inborn mental processes, in a top-down fashion, determine the organization of the individual parts of the percept, just as mountains and valleys determine the course of a river. Moreover, the Gestalt psychologists suggested, the laws of perceptual grouping exemplify a more general principle known as the **law of Prägnanz** ("meaningfulness"). This principle states that we perceive the simplest pattern possible—the percept requiring the least mental effort. The most general of all the Gestalt principles, Prägnanz (pronounced *PRAYG-nonce*) has also been called the *minimum principle of perception.* The law of Prägnanz is what makes proofreading so hard to do, as you will find when you examine Figure 3.32.

Figure 3.32 A Bird in the . . .

We usually see what we expect to see—not what is really there. Look again.

> A
> BIRD
> IN THE
> THE HAND

3.10.3: Helmholtz's Theory on How Experience Influences Perception

In 1866, Hermann von Helmholtz pointed out the important role of learning (or **nurture**) in perception. His theory of **learning-based inference** emphasized how people use prior learning to interpret new sensory information. Based on experience, then, the observer makes *inferences*—guesses or predictions—about what the sensations mean. This theory explains, for example, why you assume a birthday party is in progress when you see lighted candles on a cake: You have learned to associate cakes, candles, and birthdays.

Ordinarily, such perceptual inferences are fairly accurate. On the other hand, we have seen that confusing sensations and ambiguous arrangements can create perceptual illusions

and erroneous conclusions. Our perceptual interpretations are, in effect, hypotheses about our sensations. For example, even babies come to expect that faces will have certain features in fixed arrangements (pair of eyes above nose, mouth below nose, etc.). In fact, our expectations about faces in their usual configuration are so thoroughly ingrained that we fail to "see" facial patterns that violate our expectations, particularly when they appear in an unfamiliar orientation. When you look at the two inverted portraits of Beyoncé (Figure 3.33), do you detect any important differences between them?

Figure 3.33 Two Perspectives on Beyoncé

Although one of these photos clearly has been altered, they look similar when viewed this way.
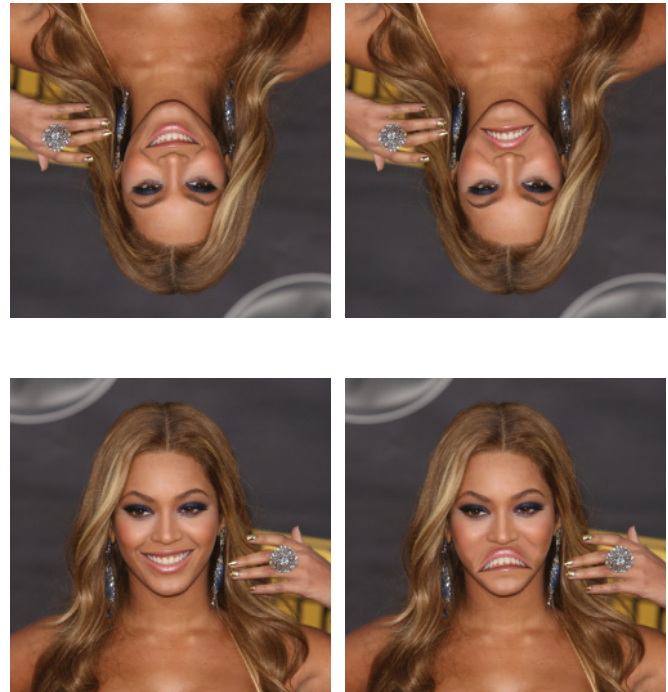
What, according to the theory of learning-based inference, determines how successful we will be in forming an accurate percept? The most important factors include the context, our expectations, and our perceptual set. We will see that each of these involves a way of narrowing our search of the vast store of concepts in long-term memory.

CONTEXT AND EXPECTATIONS   As we saw earlier, when you identify a context, you form expectations about what persons, objects, and events you are likely to experience—using the "what" pathway (Biederman, 1989). To see another example of context influencing perceptions, take a look at the following:

Figure 3.34 Example of Context Influencing Perception

> THE CAT

It says THE CAT, right? Now look again at the middle letter of each word. Physically, these two letters are written exactly the same, yet you perceived the first as an *H* and the second as an *A*. Why? Clearly, your perception was affected by what you know about words in English. The context provided by *T__E* makes an *H* highly likely and an *A* unlikely, whereas the reverse is true of the context of *C__T* (Selfridge, 1955).

Here's a more real-world example: You have probably had difficulty recognizing people you know in situations where you didn't expect to see them, such as in a different city or a new social group. The problem, of course, is not that they looked different but that the context was unusual: You didn't *expect* them to be there. Thus, perceptual identification depends on context and expectations as well as on an object's physical properties.

PERCEPTUAL SET   Another way that context and expectation exert an influence on perception involves *perceptual set*—which is closely related to expectation. Under the influence of **perceptual set**, we have a readiness to notice and respond to certain stimulus cues—like a sprinter anticipating the starter's pistol. In general, perceptual set involves a focused alertness for a particular stimulus in a given context. For example, a new mother is set to hear the cries of her child. Likewise, if you drive a sporty red car, you probably know how the highway patrol has a perceptual set to notice speeding sporty red cars.

Often, a perceptual set leads you to transform an ambiguous stimulus into the one you were expecting. To experience this yourself, read quickly through the series of words that follow in both rows:

FOX; OWL; SNAKE; TURKEY; SWAN; D?CK
 BOB; RAY; DAVE; BILL; TOM; D?CK

Notice how the words in the two rows lead you to read D?CK differently in each row. The meanings of the words read prior to the ambiguous stimulus create a perceptual set. Words that refer to animals create a perceptual set that influences you to read D?CK as "DUCK." Names create a perceptual set leading you to see D?CK as DICK.

CULTURAL INFLUENCES ON PERCEPTION   Which two of the following three items go together: chicken, cow, grass? If you are American, you are likely to group chicken and cow, because they are both animals. But if you are Chinese, you are more likely to put the latter two together, because cows eat grass. In general, says cross-cultural psychologist Richard Nisbett, Americans tend to put items in categories by abstract type rather than by relationship or function (Winerman, 2006d).

Nisbett and his colleagues have also found that East Asians typically perceive in a more holistic fashion than do Americans (Nisbett, 2003; Nisbett & Norenzayan, 2002). That is, the Asians pay more attention to, and can later recall more detail about, the context than do Americans. (This is true, incidentally, even if the American is of Chinese ancestry.) Specifically, when looking at a scene, people raised in America tend to spend more time scanning the figure, while those raised in China usually focus more on details of the ground (Chua and others, 2005). "The Americans are more zoom and the East Asians are more panoramic," says neuroscientist Denise Park (Goldberg, 2008). Such distinctions are now even showing up as subtle differences on scans comparing brain activity of Asians and Americans on simple perceptual judgment tasks (Hedden and others, 2008).

Cross-cultural psychologists have pointed to still other cultural differences in perception (Segall and others, 1999). Consider, for example, the famous Ponzo illusion, based on linear perspective depth cues (see Figure 3.35).

Figure 3.35 The Ponzo Illusion

In your opinion, which bar is longer: the one on top (marked A) or the one on the bottom (marked B)?
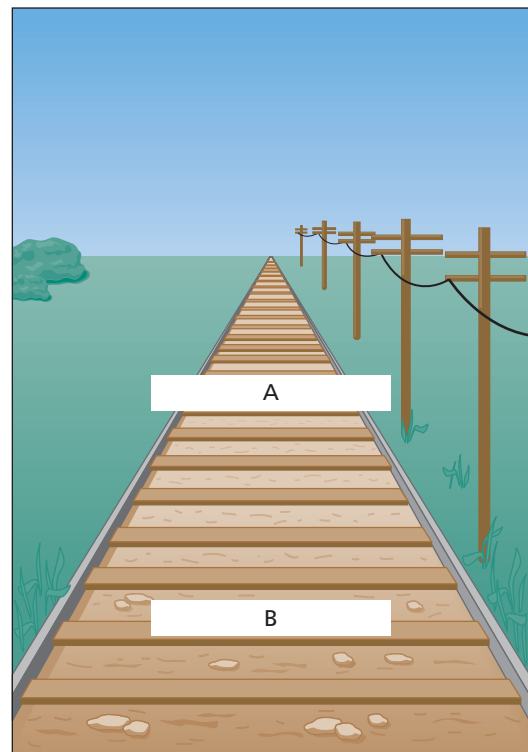
In actuality, both bars are the same length. Because A appears farther away than B, we perceive it as longer.

Research shows that responses to these figures depend strongly on culture-related experiences. Most readers of this book will report that the top bar appears longer than the bottom bar, yet people from some cultural backgrounds are not so easily fooled.

Why the difference? The world you have grown up in probably included many structures featuring parallel lines that seemed to converge in the distance: railroad tracks,

long buildings, highways, and tunnels. Such experiences leave you vulnerable to images, such as the Ponzo illusion, in which cues for size and distance are unreliable.

But what about people from cultures where individuals have had far less experience with this cue for distance? Research on this issue has been carried out on the Pacific island of Guam, where there are no Ponzo-like railroad tracks (Brislin, 1974, 1993). There, too, the roads are so winding that people have few opportunities to see roadsides "converge" in the distance. People who have spent their entire lives on Guam, then, presumably have fewer opportunities to learn the strong perceptual cue that converging lines indicate distance.

And, sure enough—just as researchers had predicted—people who had lived all their lives on Guam were less influenced by the Ponzo illusion than were respondents from the mainland United States. That is, they were less likely to report that the top line in the figure was longer. These results strongly support the argument that people's experiences (learning) affect their perceptions—as Helmholtz had theorized.

3.10.4: Depth Perception: Nature or Nurture?

Now that we have looked at two contrasting approaches to perception—**Gestalt theory**, which emphasizes nature, and **learning-based inference**, which emphasizes nurture—let's see how each explains a classic problem in psychology: depth perception. Are we born with the ability to perceive depth, or must we learn it? Let's look at the research.

Bower (1971) found evidence of depth perception in infants only 2 weeks old. By fitting his subjects with 3D goggles, he presented the infants with virtual reality images of a ball moving about in space. When the ball image suddenly appeared to move directly toward their face, the reaction was increased heart rate and obvious anxiety. This suggests that some ability for depth perception is probably inborn or heavily influenced by genetic programming that unfolds in the course of early development.

Although depth perception appears early in human development, the idea of being cautious when there is danger of falling seems to develop later in infancy. In a famous demonstration, psychologists Eleanor Gibson and Richard Walk placed infants on a Plexiglas-topped table that appeared to drop off sharply on one end. (See the accompanying photo.)

Reactions to the *visual cliff* occurred mainly in infants older than 6 months—old enough to crawl. Most readily crawled across the "shallow" side of the table, but they were reluctant to go over the "edge" of the visual cliff—indicating not only that they could perceive depth but also that they associated the drop-off with danger (Gibson & Walk, 1960). Developmental psychologists believe that

Apprehension about the "visual cliff" shows that infants make use of distance clues. This ability develops at about the same time an infant is learning to crawl.

crawling and depth perception are linked in that crawling helps infants develop their understanding of the three-dimensional world.

Digging deeper into the problem of depth perception, we find that our sense of depth or distance relies on multiple cues. We can group these depth cues in two categories, either *binocular cues* or *monocular cues.*

BINOCULAR CUES Certain depth cues require the use of two eyes—which is why they are called **binocular cues**. You can demonstrate to yourself how this works: Hold one finger about 6 inches from your eyes and look at it. Now move it about a foot farther away. Do you feel the change in your eye muscles as you focus at different distances? This feeling serves as one of the main cues for depth perception when looking at objects that are relatively close. The term for this, *binocular convergence,* suggests how the lines of vision from each eye converge at different angles on objects at different distances.

Figure 3.36 Binocular Convergence

Muscles around the eye control the angle at which the sight lines from each eye converge on objects at different distances. Feedback from these muscles is a binocular cue for distance.

SOURCE: http://www.angelfire.com/ok/szalonalaska/psyc101.html
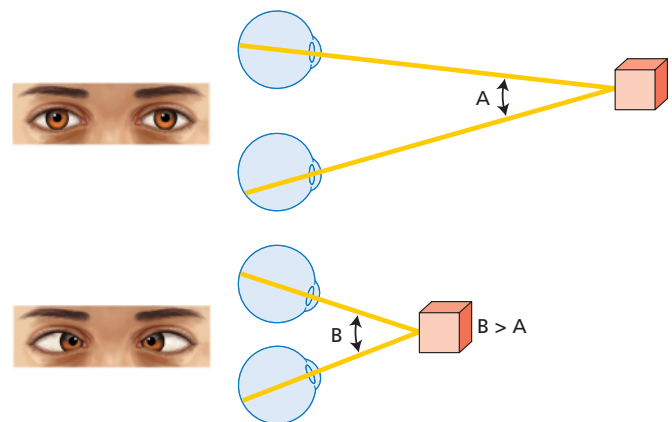
A related binocular depth cue, *retinal disparity*, arises from the difference in perspectives of the two eyes. To see how this works, again hold a finger about 12 inches from your face and look at it alternately with one eye and then with the other. Notice how you see a different view of your finger with each eye. Because we see greater disparity when looking at nearby objects than we do when viewing distant objects, these image differences coming from each eye provide us with depth information.

We can't say for sure whether the binocular cues are innate or learned. What we can say is that they rely heavily on our biology: a sense of eye muscle movement and the physically different images on the two retinas. The monocular cues, however, present a very different picture.

MONOCULAR CUES   Not all cues for depth perception require both eyes. A one-eyed pilot we know, who manages to perceive depth well enough to maneuver the airplane safely during takeoffs and landings, is proof that monocular vision conveys a great deal of depth information. Here are some of the **monocular cues** that a one-eyed pilot (or a two-eyed pilot, for that matter) could learn to use while flying:

- If two objects that are assumed to be the same size cast different-sized images on the retina, observers usually judge them to lie at different distances. So a pilot flying low can learn to use the relative size of familiar objects on the ground as a cue for depth and distance. Because of this cue, automakers who install wide-angle rear-view mirrors always inscribe the warning on them, "Objects in the mirror are closer than they appear."

The monocular cue of relative size makes objects look deceptively distant in a wide-angle rear-view mirror.

- If you have ever looked down a long, straight railroad track, you know that the parallel rails seem to come together in the distance—as we saw in the Ponzo illusion. Likewise, a pilot approaching a runway for landing sees the runway as being much wider at the near end than at the far end. Both examples illustrate how *linear perspective*, the apparent convergence of parallel lines, can serve as a depth cue.
- Lighter-colored objects seem closer to us, and darker objects seem farther away. Thus, *light and shadow* work together as a distance cue. You will notice this the next time you drive your car at night with the headlights on: Objects that reflect the most light appear to be nearer than more dimly lit objects in the distance.
- We assume that closer objects will cut off our vision of more distant objects behind them, a distance cue known as *interposition*. So we know that partially hidden objects are more distant than the objects that hide them. You can see this effect right in front of you now, as your screen partially obscures the background, which you judge to be farther away.
- As you move, objects at different distances appear to move through your field of vision at a different rate or with a different *relative motion*. Look for this one from your car window. Notice how the power poles or fence posts along the roadside appear to move by at great speed, while more distant objects stay in your field of view longer, appearing to move by more slowly. With this cue, student pilots learn to set up a glide path to landing by adjusting their descent so that the end of the runway appears to stay at a fixed spot on the windshield while more distant points appear to move upward and nearer objects seem to move downward.
- Haze or fog makes objects in the distance look fuzzy, less distinct, or invisible, creating another learned distance cue called *atmospheric perspective.* In the accompanying photo, you can see that more distant buildings lack clarity through the Los Angeles smog. At familiar airports, most pilots have identified a landmark 3 miles away. If they cannot see the landmark, they know that they must fly by relying on instruments.
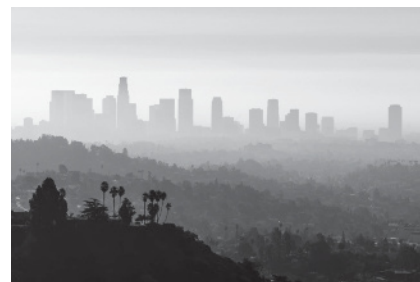
Haze, fog, or air pollution makes distant objects less distinct, creating atmospheric perspective, which acts as a distance cue. Even the air itself provides a cue for distance by giving faraway objects a bluish cast.

So which of the two theories about perception that we have been discussing—Helmholtz's learning theory or the Gestaltists' innate theory—best accounts for depth perception? Both of them! That is, depth and distance perception—indeed, all our perceptual processes—show the influence of both nature and nurture.

3.11: Seeing and Believing

Objective: **Explain why we know that our perceptions do not always give us an accurate representation of our world.**

If you assume, as most people do, that your senses give you an accurate and undistorted picture of the outside world, you are mistaken (Segall and others, 1990). We hope that the illusions presented in this chapter will help make the point. We also hope that the chapter has helped you realize that people see the world through the filter of their own perceptions—and that marketing and politics depend on manipulating our perceptions (think iPhones and Droids).

Magicians are also experts in manipulating perceptions—and so perceptual scientists are making them partners in perceptual research (Hyman, 1989; Martinez-Conde & Macknik, 2008; Sanders, 2009). The results include discoveries about change blindness, inattentional blindness and brain modules involved in both attention and perception. Unlike magicians, however, perceptual scientists are happy to reveal how sensation and perception play tricks on us all. (Incidentally, a magician friend of ours warns that smart people are the easiest ones to fool. So watch out!)

We hope that this chapter has shaken your faith in your senses and perceptions . . . just a bit. To drive the point home, consider this statement (which, unfortunately, was printed backward):

.rat eht saw tac ehT

Please turn it around in your mind: What does it say? At first most people see a sensible sentence that says, "The cat saw the rat." But take another look. The difficulty lies in the power of expectations to shape your interpretation of stimulation.

This demonstration illustrates once again that we don't merely sense the world as it is; we perceive it. The goal of the process by which stimulation becomes sensation and, finally, perception is to find meaning in our experience. But it is well to remember that we impose our own meanings on sensory experience.

Differences in the ways we interpret our experiences explain why two people can look at the same sunset, the same presidential candidates, or the same religions and perceive them so differently. Perceptual differences make us unique individuals. An old Spanish proverb makes the point elegantly:

En este mundo traidor	In this treacherous world
No hay verdad ni mentira;	There is neither truth nor lie;
Todo es según el color	All is according to the color
Del cristál con que se mira.	Of the lens through which we spy.

With this proverb in mind, let's return one more time to the problem with which we began the chapter—and in particular to the question of whether the world looks (feels, tastes, smells . . .) the same to different people. This is our answer: We have every reason to suspect that we all (with some variation) *sense* the world in roughly the same way. But because we attach different meanings to our sensations, it is clear that people *perceive* the world in many different ways—with, perhaps, as many differences as there are people.

Psychology Matters

Using Psychology to Learn Psychology

One of the most mistaken notions about studying and learning is that students should set aside a certain amount of time for study every day. This is not to suggest that you shouldn't study regularly. Rather, it is to say that you shouldn't focus on merely putting in your time. So where should you place your emphasis? (And what does this have to do with perceptual psychology?)

Recall the concept of *Gestalt*, the idea of the meaningful pattern, discussed earlier in this chapter. The Gestalt psychologists taught that we have an innate tendency to understand our world in terms of meaningful patterns. Applied to your studying, this means that your emphasis should be on finding meaningful patterns—Gestalts—in your course work.

In this chapter, for example, you will find that your authors have helped you by dividing the material into three major sections. You can think of each section as a conceptual Gestalt built around a core concept that ties it together and gives it meaning. We suggest that you organize your study of psychology around one of these meaningful units of material. That is, identify a major section of your book and study that until it makes sense.

To be more specific, you might spend an hour or two working on the first section of this chapter, where you would not only read the material but also connect, in your mind, each boldfaced key term to the core concept. For example, what does the **difference threshold** have to do with the idea that the brain senses the world through neural messages? (Sample brief answer: The brain is geared to detect *changes* or *differences* that are conveyed to it in the form of neural impulses.) We suggest that you do the same thing with each of the other boldfaced key terms in the chapter. The result will be a deeper understanding of the material. In perceptual terms, you will be constructing a meaningful pattern—a Gestalt—around the core concept.

You can do that only by focusing on meaningful units of material rather than on the clock.

Critical Thinking Applied: Subliminal Perception and Subliminal Persuasion

Could extremely weak stimulation—stimulation that you don't even notice—affect your attitudes, opinions, or behavior? We know that the brain does a lot of information processing outside of awareness. So the notion that your sensory system can operate below the level of awareness is the basis for the industry that sells "subliminal" recordings touted as remedies for obesity, shoplifting, smoking, and low self-esteem. The same notion also feeds the fear that certain musical groups embed hidden messages in their recordings or that advertisers may be using subliminal messages to influence our buying habits and, perhaps, our votes (Vokey, 2002).

This photo carries a subliminal message, explained in the text.

What Are the Critical Issues?

People are always hoping for a bit of magic. But before you put your money in the mail for that subliminal weight-loss CD, let's identify what exactly we're talking about—and what we're *not* talking about. If subliminal persuasion works as claimed, then it must work on *groups* of people—a mass audience—rather than just on individuals. It also means that a persuasive message can change the behavior of large numbers of people, even though no one is aware of the message. The issue is not whether sensory and perceptual processing can occur outside of awareness. The issue is whether subliminal messages can effect a substantial change in people's attitudes, opinions, and behaviors.

FAME, FORTUNE, FRAUD, AND SUBLIMINAL PERCEPTION   There is always a possibility of fraud when fortune or fame is involved, which is certainly the case with claims of amazing powers—such as persuasion through subliminal perception. This should cue us to ask: What is the source of claims that subliminal persuasion techniques work? That question leads us to an advertising executive, one James Vicary, who dramatically announced to the press some years ago that he had discovered an irresistible sales technique, now known as "subliminal advertising." Vicary said that his method consisted of projecting very brief messages on the screen of a movie theater, urging the audience to "Drink Coke" and "Buy popcorn." He claimed that the ads presented ideas so fleetingly that the conscious mind could not perceive them—yet, he said, the messages would still lodge in the unconscious mind, where they would work on the viewers' desires unnoticed. Vicary also boasted that sales of Coca-Cola and popcorn had soared at a New Jersey theater where he tested the technique.

The public was both fascinated and outraged. Subliminal advertising became the subject of intense debate. People worried that they were being manipulated by powerful psychological forces without their consent. As a result, laws were proposed to quash the practice. But aside from the hysteria, was there any real cause for concern? To answer that question, we must ask: What is the evidence?

EXAMINING THE EVIDENCE   Let's first see what the psychological science of perceptual thresholds can tell us. As you will recall, a threshold refers to the minimum amount of stimulation necessary to trigger a response. The word **subliminal** means "below the threshold" (limen = threshold). In the language of perceptual psychology, subliminal more specifically refers to stimuli lying near the absolute threshold. Such stimuli may, in fact, be strong enough to affect the sense organs and to enter the sensory system without causing conscious awareness of the stimulus. But the real question is this: Can subliminal stimuli in this range influence our thoughts and behavior?

Several studies have found that subliminal words flashed briefly on a screen (for less than 1/100 second) can "prime" a person's later responses (Merikle & Reingold, 1990). For example, can you fill in the following blanks to make a word?

$$S N \_ \_ \_ E L$$

If you had been subliminally primed by a brief presentation of the appropriate word or picture, it would be more

likely that you would have found the right answer, even though you were not aware of the priming stimulus. So does the fact that subliminal stimulation can affect our responses on such tasks mean that subliminal persuasion really works?

Of course, priming doesn't *always* work: It merely increases the chances of getting the "right" answer. The answer to the problem, by the way, is "snorkel." And were you aware that we were priming you with the photo of a snorkeler? If you were, it just goes to show that sometimes people *do* realize when they are being primed.

What Conclusions Can We Draw?

Apparently people do perceive stimuli below the absolute threshold, under circumstances such as the demonstration earlier (Greenwald and others, 1996; Reber, 1993). Under very carefully controlled conditions, subliminal perception is a fact. But here is the problem for would-be subliminal advertisers who would attempt to influence us in the uncontrolled world outside the laboratory: Different people have thresholds at different levels. So what might be *sub*liminal for us could well be *supra*liminal (above the threshold) for you. Consequently, the would-be subliminal advertiser runs the risk that some in the audience will

notice—and perhaps be angry about—a stimulus aimed slightly below the average person's threshold. In fact, *no controlled research has ever shown that subliminal messages delivered to a mass audience can influence people's buying habits or voting patterns.*

And what about those subliminal recordings that some stores play to prevent shoplifting? Again, no reputable study has ever demonstrated their effectiveness. A more likely explanation for any decrease in shoplifting attributed to these messages lies in increased vigilance from employees who know that management is worried about shoplifting. The same goes for the tapes that claim to help you quit smoking, lose weight, become wildly creative, or achieve dozens of other elusive dreams. In a comprehensive study of subliminal self-help techniques, the U.S. Army found all to be without foundation (Druckman & Bjork, 1991). The simplest explanation for reports of success lies in the purchasers' expectations and in the need to prove that they did not spend their money foolishly. And finally, to take the rest of the worry out of subliminal persuasion, you should know one more bit of evidence. James Vicary eventually admitted that his claims for subliminal advertising were a hoax (Druckman & Bjork, 1991).

Summary: Sensation and Perception

Chapter Problem

Is there any way to tell whether the world we "see" in our minds is the same as the external world—and whether we see things as most others do?

There is no sharp dividing line between **sensation** and **perception**. However, psychologists who study *sensation* do so primarily from a **biological perspective;** those studying *perception* do so primarily from a **cognitive perspective**.

Different people probably have similar **sensations** in response to a stimulus because their sense organs and parts of the brain they use in sensation are similar. People differ, however, in their **perceptions**, because they draw on different experiences to interpret their sensations.

The brain does not sense the external world directly. The sense organs *transduce* stimulation and deliver stimulus information to the brain in the form of neural messages. Our sensory experiences are, therefore, what the

brain creates from the information delivered in these neural impulses.

How Does Stimulation Become Sensation?

> ### Core Concept 3.1
> The brain senses the world indirectly because the sense organs convert stimulation into the language of the nervous system: neural messages.

The most fundamental step in sensation involves the **transduction** by the sense organs of physical stimuli into neural messages, which are sent onward in the sensory pathways to the appropriate part of the brain for further processing. Not all stimuli become sensations, because some fall below the **absolute threshold**. Further, changes in stimulation are noticed only if they exceed the **difference threshold**. Classical psychophysics focused on identifying thresholds for sensations and

for just-noticeable differences, but a newer approach, called **signal detection theory**, explains sensation as a process involving context, physical sensitivity, and judgment. We should consider our senses to be *change detectors:* Through the process of **sensory adaptation**, our senses accommodate to unchanging stimulation, and so we become less and less aware of constant stimulation.

How Are the Senses Alike? How Are They Different?

> ### Core Concept 3.2
> **The senses all operate in much the same way, but each extracts different information and sends it to its own specialized sensory processing regions in the brain.**

All the senses involve transduction of physical stimuli into neural messages. Thus, our sensations are not properties of the original stimulus, but rather are creations of the brain. In vision, we make use of light waves from only a small "window" of the **electromagnetic spectrum**. These light waves are channeled by **Müller cells** to **photoreceptors** in the back of the retina, which transduce them into neural codes that retain the **frequency** and **amplitude** information. This visual information is then transmitted by **bipolar cells** and the optic nerve to the brain's occipital lobe, which converts the neural signals into sensations of **color** and **brightness**. **Color blindness** usually results from genetic defects in the **cones**. Both the **trichromatic theory** and the **opponent-process theory** are required to explain how visual sensations are extracted. The latter better explains negative **afterimages**.

In the ear, sound waves in the air cause the eardrum and other structures in the middle ear to vibrate. These vibrations are transduced into neural energy in the **cochlea** and then sent, via the auditory nerve, to the brain's temporal lobe, where frequency and amplitude information are converted to sensations of **pitch**, **loudness**, and **timbre**.

Other senses include position and movement (the **vestibular** and **kinesthetic senses**), smell, taste, the **skin senses** (touch, pressure, and temperature), and pain. Like vision and hearing, these other senses have specialized receptors that are particularly sensitive to changes in stimulation. Further, all sensations are carried to the brain by neural messages, but we experience different sensations because the messages from the different senses are processed by different sensory regions of the brain. In some people, however, **synesthesia** occurs when sensations spread across sensory domains, especially between sensory areas of the brain that lie close together.

The experience of pain can be the result of intense stimulation in any of several sensory pathways. While we don't completely understand pain, the **gate-control theory** explains how pain can be suppressed by competing sensations or other mental processes. Similarly, the ideal *analgesic*—one without unwanted side effects—has not been discovered, although the **placebo effect** works exceptionally well for some people.

What Is the Relationship Between Sensation and Perception?

> ### Core Concept 3.3
> **Perception brings *meaning* to sensation, so perception produces an interpretation of the world, not a perfect representation of it.**

Psychologists define perception as the stage at which meaning is attached to sensation. Visual identification of objects involves **feature detectors** in the **what pathway** that projects to the temporal lobe. The **where pathway**, projecting to the parietal lobe, involves the location of objects in space. The ability known as **blindsight** occurs because the where pathway can operate outside of consciousness. We also derive meaning from **bottom-up processing** of stimulus cues picked up by feature detectors and from **top-down processing**, especially involving memories and expectations. What remains unclear is how the brain manages to combine the output of many sensory circuits into a single **percept**: This is called the **binding problem**. By studying such perceptual phenomena as **illusions**, **perceptual constancies**, **change blindness**, and **inattentional blindness**, researchers can learn about the factors that influence and distort the construction of perceptions. Illusions demonstrate that perception does not necessarily form an accurate representation of the outside world.

Perception has been explained by theories that differ in their emphasis on the role of innate brain processes versus learning—nature versus nurture. **Gestalt psychology** emphasizes innate factors that help us organize stimulation into meaningful patterns. In particular, the Gestaltists have described the processes that help us distinguish **figure** from **ground**, to identify contours and apply **closure**, and to group stimuli according to the laws of **similarity**, **proximity**, **continuity**, and **common fate.** Some aspects of *depth perception*, such as *retinal disparity* and *convergence*, may be innate as well. The theory of **learning-based inference** also correctly points out that perception is influenced by experience, such as *context*, **perceptual set**, and *culture.* Many aspects of depth perception, such as *relative motion*, *linear perspective*, and

atmospheric perspective, seem to be learned. Some rely on **binocular cues** and others on **monocular cues**.

Despite all we know about sensation and perception, many people uncritically accept the evidence of their senses (and perceptions) at face value. This allows magicians, politicians, and marketers an opening through which they can manipulate our perceptions and, ultimately, our behavior.

Critical Thinking Applied: Subliminal Perception and Subliminal Persuasion

Subliminal messages, in the form of *priming*, have been shown to affect an individual's responses on simple tasks under carefully controlled conditions. Yet, despite well-publicized claims to the contrary, there is no evidence that techniques of **subliminal** persuasion are effective in persuading a mass audience to change their attitudes or engage in complex behaviors.

Additional Video Resources

Here are four video resources we think you will find both interesting and of personal value to understanding the concepts of sensation and perception.

WATCH Beau Lotto: Optical Illusions Show How We See

Check out this TED talk by Beau Lotto, which engagingly shows how our distortions in visual perception can serve as a window into the workings of our brains. View the video at: http://www.ted.com/talks/beau_lotto_optical_illusions_show_how_we_see?language=en

WATCH Selective Attention Test

Watch this classic video illustrating inattentional blindness. View the video at: http://www.theinvisiblegorilla.com/videos.html

Chapter 4
Learning and Human Nurture

Behavioral psychology examines how experiences shape behavior, including our learned associations, our habits, and our fears.

⌄ Core Concepts

4.1 Classical conditioning explains associative learning, in which a stimulus that produces an innate reflex becomes associated with a previously neutral stimulus, which then acquires the power to elicit essentially the same response.

4.2 In operant conditioning, the consequences of behavior, such as rewards and punishments,

influence the probability that the behavior will occur again.

4.3 According to cognitive psychology, some forms of learning must be explained as changes in mental processes rather than as changes in behavior alone.

In 1924, John Watson boasted, "Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief, and, yes, even

beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors." Decades later, the assumption behind Watson's lofty claim became the bedrock on which the community called Walden Two was built: *Nurture* trumps *nature.* Or, to put it another

way: Environment carries far more weight than heredity in determining our behavior.

At Walden Two, residents can enter any sort of profession that interests them. In their leisure time, they can do whatever they like: attend concerts, lie on the grass, read, or perhaps drink coffee with friends. They have no crime, no drug problems, and no greedy politicians. In exchange for this happy lifestyle, community members must earn four "labor credits" each day, doing work needed by the community. (That's about 4 hours' work—fewer hours for unpleasant tasks, such as cleaning sewers, but more for the easiest work, perhaps pruning the roses.) Following Watson's vision, the founder of Walden Two believed people could have happy, fulfilling lives in an environment psychologically engineered to reward people for making socially beneficial choices. To reap these benefits, all a community must do is change the way it distributes rewards.

Where was this community built? Only in the mind of behaviorist B. F. Skinner. You see, *Walden Two* is a novel written by Skinner (1948) to promote his ideas on better living through behavioral psychology. But so alluring was the picture he painted of this mythical miniature society that many real-world communes sprang up, using *Walden Two* as the blueprint.

None of the real communities based on *Walden Two* ran so smoothly as the one in Skinner's mind. Yet at least one such group, Twin Oaks, located in Virginia, thrives after more than 40 years—but not without substantial modifications to Skinner's vision (Kincade, 1973). In fact, you can learn more about this group through its website (Twin Oaks Intentional Community Homepage, 2016).

Nor was behaviorism's fate exactly as Skinner had envisioned it. Although the behaviorist perspective dominated psychology during much of the 20th century, its fortunes fell as cognitive psychology grew in prominence. But what remains is behaviorism's substantial legacy, including impressive theories of behavioral learning and a valuable set of therapeutic tools for treating learned disorders such as fears and phobias. To illustrate what behaviorism has given us, consider the problem that confronted Sabra.

A newly minted college graduate, Sabra landed a dream job at an advertising firm in San Francisco. The work was interesting and challenging, and she enjoyed her new colleagues. The only problem was that her supervisor had asked her to attend an upcoming conference in Hawaii—and take an extra few days of vacation there at the company's expense. Why was that a problem? Sabra had a fear of flying.

> **CHAPTER PROBLEM: Assuming Sabra's fear of flying was a response she had learned, could it also be treated by learning? If so, how?**

A common stereotype of psychological treatment involves "reliving" traumatic experiences that supposedly caused fear or some other symptom. Behavioral learning therapy, however, works differently. It focuses on the here and now instead of the past: The therapist acts like a coach, teaching the client new responses to replace old problem behaviors. So, as you consider how Sabra's fear might be treated, you might think along the following lines:

- What problematic behaviors would we expect to see in people like Sabra who are afraid of flying?
- What behaviors could Sabra learn to replace her fearful behavior?
- How could these new behaviors be taught?

While the solution to Sabra's problem involves learning, it's not the sort of hit-the-books learning that usually comes to mind for college students. Psychologists define the concept of **learning** broadly, as a process through which experience produces a lasting change in behavior or mental processes. According to this definition, then, Sabra's "flight training" would be learning—just as taking golf lessons or reading this text is a learning experience.

To avoid confusion, two parts of our definition need elaboration.

1. First, we underscore the idea that learning involves a *lasting change.* Suppose you go to your doctor's office and get a particularly painful injection, during which the sight of the needle becomes associated with pain. The result: The next time you need a shot, and every time thereafter, you wince when you first see the needle. This persistent change in responding involves learning. In contrast, a simple, reflexive reaction, such as jumping when you hear an unexpected loud noise, does *not* qualify as learning because it produces no lasting change—nothing more than a fleeting reaction, even though it does entail a change in behavior.

2. Second, learning affects *behavior* or *mental processes.* In the doctor's office example above, it is easy to see how learning affects behavior. But mental processes are more difficult to observe. How could you tell, for example, whether a laboratory rat had simply memorized the behaviors required to negotiate a maze (turn right, then left, then right . . .) or whether it was following some sort of mental image of the maze, much as you would follow a road map? (And why should we care what, if anything, was on a rat's mind?) Let's venture a little deeper into our definition of learning by considering the controversy surrounding mental processes.

Behavioral Learning Versus Cognitive Learning

The problem of observing mental events, whether in rats or in people, underlies a long-running controversy between

behaviorists and cognitive psychologists. For more than 100 years, behaviorists maintained that psychology could be a true science only if it disregarded subjective mental processes and focused solely on observable stimuli and responses. On the other side of the issue, cognitive psychologists contend that the behavioral view is far too limiting and that understanding learning requires us to make inferences about hidden mental processes. In the following pages, we will see that both sides in this dispute have made important contributions to our knowledge.

Learning Versus Instincts

What does learning—either behavioral or cognitive—do for us? Nearly all human activity, from working to playing to interacting with family and friends, involves some form of learning. Without learning, we would have no human language. We wouldn't know who our family or friends were. We would have no memory of our past or goals for our future. And without learning, we would be forced to rely on simple reflexes and a limited repertoire of innate behaviors, sometimes known as **instincts**.

In contrast with learning, instinctive behavior is heavily influenced by genetic programming, as we see in bird migrations or animal mating rituals. In humans, however, behavior is much more influenced by learning than by instincts. For us, learning provides greater flexibility to adapt quickly to changing situations and new environments. In this sense, then, learning represents an evolutionary advance over instincts.

The giant leatherback turtle "instinctively" returns to its birthplace each year to nest. Although this behavior is heavily influenced by genetics, environmental cues like tidal patterns also play a role. Thus, scientists usually shun the term *instinct*, preferring the term *species-typical behavior*.

Simple and Complex Forms of Learning

Some forms of learning are quite simple. For example, if you live near a busy street, you may learn to ignore the sound of the traffic. This sort of learning, known as **habituation**, involves learning *not to respond* to stimulation. Habituation occurs in all animals that have nervous systems, from insects and worms to people. It helps you focus on important stimuli while ignoring stimuli that need no attention, such as the feel of the chair you are sitting on or the sound of the air conditioning in the background.

Another relatively simple form of learning is our general preference for familiar stimuli as contrasted with novel stimuli. This **mere exposure effect** occurs regardless of whether the stimulus was associated with something pleasurable, or whether we were even aware of the stimulus. The mere exposure effect probably accounts for the effectiveness of much advertising (Zajonc, 1968, 2001). It also helps explain our attraction to people we see often at work or school and for songs we have heard at least a few times.

Other kinds of learning can be more complex. One type involves learning a connection between two stimuli—as when you associate a certain scent with a particular person who wears that fragrance. Another occurs when we associate our actions with rewarding or punishing consequences, such as a reprimand from the boss or an A from a professor. These are examples of two especially important forms of **behavioral learning**, which we will call **classical conditioning** and **operant conditioning**.

Even more complex is the study of internal mental processes. **Cognitive learning** considers how sudden "flashes of insight" and imitative behavior require theories that go beyond behavioral learning to explain how we solve problems or why children imitate behavior for which they see other people being rewarded. Cognitive learning also aims to explain acquisition of concepts, the most complex form of learning and, notably, the sort of learning you do in your college classes.

All these types of learning—both simple and complex—can be applied to help Sabra overcome her fear of flying. What's more, they offer a variety of tips to help you study more effectively—and enjoy it.

Let's begin, then, with a form of behavioral learning that accounts for many of your own likes and dislikes: a concept known as *classical conditioning*.

Key Question: What Sort of Learning Does Classical Conditioning Explain?

> **Core Concept 4.1**
>
> **Classical conditioning explains associative learning, in which a stimulus that produces an innate reflex becomes associated with a previously neutral stimulus, which then acquires the power to elicit essentially the same response.**

Ivan Pavlov (1849–1936) would have been insulted had you called him a psychologist. In fact, this Russian

physiologist had only contempt for the structuralist and functionalist psychology of his time, which he saw as hopelessly mired in speculation about subjective mental life (Todes, 1997). Pavlov and the hundreds of student researchers who passed through his research "factory" were famous for their work on the digestive system—for which Pavlov eventually snared a Nobel prize (Fancher, 1979; Kimble, 1991).

To study classical conditioning, Pavlov placed his dogs in a restraining apparatus. The dogs were then presented with a *neutral stimulus*, such as a tone. Through its association with food, the neutral stimulus became a *conditioned stimulus* eliciting salivation.

Unexpectedly, however, their experiments on salivation (the first step in digestion) went awry, sending Pavlov and his crew on a detour into the psychology of learning—a detour that occupied Pavlov for the rest of his life. The problem they encountered was that their experimental animals began salivating even *before* food was put in their mouths (Dewsbury, 1997), which—from a biological perspective—was inexplicable, as salivation normally occurs only *after* food enters the mouth. Yet, in Pavlov's animals, saliva would start flowing when they merely saw the food or they heard the footsteps of the lab assistant bringing the food.

This response was a puzzle. What could be the biological function of salivating before receiving food? When Pavlov and his associates turned their attention to understanding these "psychic secretions," they made a series of discoveries that would forever change the course of psychology (Pavlov, 1928; Todes, 1997). Quite by accident, they had stumbled upon an objective model of learning that could be manipulated in the laboratory to tease out the connections among stimuli and responses. This discovery, now known as *classical conditioning*, forms the core concept for this section

> Classical conditioning explains associative learning, in which a stimulus that produces an innate reflex becomes associated with a previously neutral stimulus, which then acquires the power to elicit essentially the same response.

In the following pages, we will see that classical conditioning accounts for some important behavior patterns found not only in animals but also in people. By means of classical conditioning, organisms learn about cues that help them anticipate and avoid danger, as well as cues alerting them to food, sexual opportunity, and other conditions that promote survival. First, however, let's examine the fundamental features Pavlov identified in classical conditioning.

By the end of this section, you will be able to:

4.1 Describe the processes involved in classical conditioning

4.2 Review some of the areas in real life where Pavlov's classical conditioning techniques may be applied

4.1: The Essentials of Classical Conditioning

Objective: Describe the processes involved in classical conditioning

Pavlov's work on learning focused on manipulating simple, automatic responses known as **reflexes** (Windholz, 1997). Salivation and eye blinks are examples of such reflexes, which commonly result from stimuli that have biological significance: The blinking reflex, for example, protects the eyes; the salivation reflex aids digestion.

Pavlov's great discovery was that his dogs could associate these reflexive responses with *new* stimuli—neutral stimuli that had previously produced no response (such as the sound of the lab assistant's footsteps). Thus, they could *learn* the connection between a reflex and a new stimulus. For example, Pavlov found he could teach a dog to salivate upon hearing a certain sound, such as the tone produced by striking a tuning fork or a bell. You have experienced the same sort of learning if your mouth waters when you read the menu in a restaurant or smell something savory.

To understand how these "conditioned reflexes" worked, Pavlov's team employed a simple experimental strategy. They first placed an untrained dog in a harness and set up a vial to capture the animal's saliva. Then, at intervals, they sounded a tone, after which they immediately gave the dog a bit of food. At first, the dog salivated only after receiving the food—demonstrating a normal, biological reflex. But gradually, over a number of trials pairing the tone with the food, the dog began to salivate in response to the tone alone. Pavlov and his students had discovered that a *neutral stimulus* (one without any reflex-provoking power, such as a tone or a light), when paired with a natural reflex-producing stimulus (such as food), will by itself begin to elicit a learned response (salivation) similar to the original reflex. In humans, classical conditioning is the learning process that makes us associate romance with flowers or chocolate.

Figure 4.1 illustrates the main features of Pavlov's classical conditioning procedure. At first glance, the terms may seem a bit overwhelming. Nevertheless, you will find it immensely helpful to study them carefully now so they will come to mind easily later—when we analyze complicated, real-life learning situations, as in the acquisition and treatment of fears, phobias, and food aversions.

Figure 4.1 Basic Features of Classical Conditioning

Before conditioning

Food
Unconditioned stimulus (UCS)

Automatically elicits →

Salivation
Unconditioned response (UCR)

Tone
Neutral stimulus (NS)

✗

No salivation
No response or irrevelant response

During conditioning (acquisition)

Tone
Neutral stimulus (NS)

Followed by →

Food
Unconditioned stimulus (UCS)

Elicits →

Salivation
Unconditioned response (UCR)

After conditioning

Tone
Conditioned stimulus (CS)

Elicits →

Salivation
Conditioned response (CR)

4.1.1: Acquisition

Classical conditioning always involves an **unconditioned stimulus (UCS)**, a stimulus that automatically—that is, without conditioning—triggers a reflexive response. Pavlov used food as the UCS because it reliably produced the salivation reflex. In the language of classical conditioning, then, this is called an unconditioned reflex or, more commonly, an **unconditioned response (UCR)**. It is important to realize that the UCS–UCR connection is "wired in" and so involves no learning. His dogs didn't have to learn to salivate when they received food, just as you don't have to learn to cry out when you feel pain: Both are UCRs.

Acquisition, the initial learning stage in classical conditioning, pairs a new stimulus with the UCS. This new stimulus has no "wired-in" meaning and thus is called a **neutral stimulus (NS)**. Typically, after several trials, the NS (the tone produced by a tuning fork, for example) will trigger essentially the same response as does the UCS. So, in Pavlov's experiments, when the sound alone began to produce salivation, this previously NS became a *conditioned stimulus (CS)*. Although the response to the CS is essentially the same as the response originally produced by the UCS, we now refer to it as the *conditioned response (CR)*—because it is occurring as a result of conditioning, or learning. The same thing may have happened to you in grade school, when your mouth watered (a conditioned response) at the sound of the lunch bell (a CS).

WATCH How Exactly Does Acquisition Work?
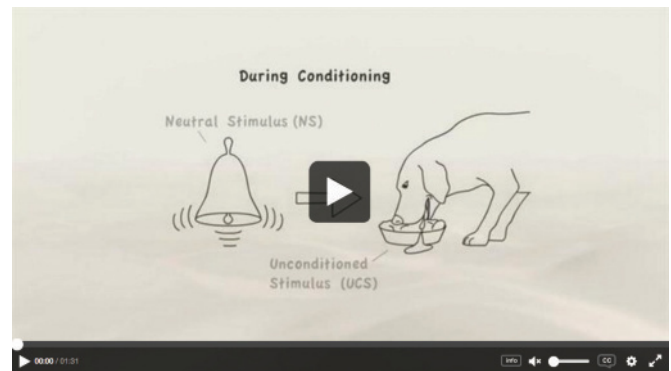
See and hear the details of how a behavior develops through classical conditioning.

In conditioning, as in telling a joke, timing is critical. In most cases, the NS and UCS must occur *contiguously* (close together in time) so the organism can make the association between the two stimuli. The ideal time interval between the NS and UCS depends on the type of response being conditioned. For motor responses, such as eye blinks, a short interval of 1 second or less is best. For visceral responses, such as heart rate and salivation, longer intervals of 5 to 15 seconds work best. Conditioned fear optimally requires even longer intervals of many seconds or even minutes between the CS and the UCS. Taste aversions, we will see, can develop even after several hours' delay. (These time differentials probably have survival value. For example, in the

case of taste aversions, rats seem to be genetically programmed to eat small amounts of an unfamiliar food and, if they don't get sick, return to the food after a few hours.)

These, then, are the building blocks of classical conditioning: the UCS, UCR, NS (which becomes the CS), and CR. Why did it take Pavlov three decades and 532 experiments to study such a simple phenomenon? There was more to classical conditioning than first met Pavlov's eyes. Along with acquisition, he also discovered extinction, spontaneous recovery, generalization, and discrimination—which we will now explore.

4.1.2: Extinction and Spontaneous Recovery

As a result of your grade-school experience with lunch bells, would your mouth still water at the sound of a school bell in your neighborhood today? In other words, do conditioned responses remain permanently in your behavioral repertoire? The good news, based on experiments by Pavlov's group, suggests they do not. Conditioned salivation responses in Pavlov's dogs were easily eliminated by withholding the UCS (food) over several trials in which the CS (the tone) was presented alone. In the language of classical conditioning, we call this **extinction**

(in classical conditioning). It occurs when a conditioned response disappears after repeated presentations of the CS without the UCS. Figure 4.2 shows how the conditioned response (salivation) becomes weaker and weaker during extinction trials. So, after years of hearing bells that were not immediately followed by food, we would not expect a mouth-watering response if you hear a bell today. Extinction, then, is of considerable importance in behavioral therapies for fears and phobias, such as Sabra's fear of flying.

Now for the bad news: Imagine that, after many years, you are visiting your old grade school to give a presentation to the first graders. While you are there, the lunch bell rings—and, to your surprise, your mouth waters. Why? The conditioned response has made a spontaneous recovery. Much the same thing happened with Pavlov's dogs: Occasionally, after undergoing extinction training, they would salivate again when they heard the tone. In technical terms, this **spontaneous recovery** occurs when the CR reappears after extinction and after a period without exposure to the CS. Happily, when spontaneous recovery happens, the conditioned response nearly always reappears at a lower intensity, as you can see in Figure 4.2. In practice, then, the CR can gradually be eliminated, although this may require several extinction sessions.

Figure 4.2 Acquisition, Extinction, and Spontaneous Recovery
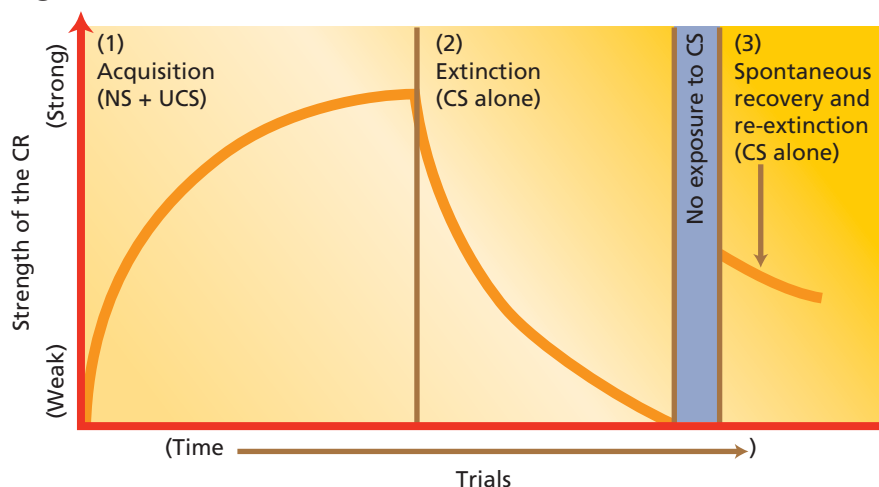
4.1.3: Generalization

Now, switching to a visual CS, suppose you were bitten by a spider, the wound was painful, and as a result you developed a fear of spiders. Chances are, your fear would not be limited to only the specific type of spider that bit you; instead, you would probably respond the same way to spiders of all sizes and markings. We call this **stimulus generalization**: extending the conditioned response to stimuli that are similar to the CS. Pavlov demonstrated stimulus generalization in his laboratory by showing that a well-trained dog would salivate in response to a tone of a slightly different pitch from the one used during conditioning. As you would expect, the closer the new sound was to the original, the stronger the response.

In everyday life, we see stimulus generalization when people acquire fears as a result of traumatic events. So a person who, as a child, was frightened by a clown at a circus may develop a fear of all clowns—and maybe even of circuses—rather than fearing only the specific clown responsible for the scare. Likewise, stimulus generalization accounts for an allergy sufferer's sneeze upon seeing a paper flower. In short, by means of stimulus generalization, we learn to give old responses in new situations.

One in 12 Americans is afraid of clowns (coulrophobia), making clowns a greater source of fear than ghosts. Have you developed any fears as a result of classical conditioning?

4.1.4: Discrimination Learning

As a child, you may have learned to salivate at the sound of the lunch bell, but—thanks to stimulus discrimination—your mouth probably didn't water when the doorbell rang. Much the opposite of stimulus generalization, **stimulus discrimination** occurs when an organism learns to distinguish between two similar stimuli, and respond to one but not to the other. Pavlov and his students demonstrated this when they taught dogs to distinguish between two tones of different frequencies. Once again, their procedure was simple: One tone was followed by food, whereas another was not. Over a series of trials, the dogs gradually learned to discriminate

between the tones, evidenced in salivation elicited by one tone and not the other. Beyond the laboratory, stimulus discrimination is the concept that underlies advertising campaigns aimed at conditioning us to discriminate between particular brands, as in the perennial battle between Pepsi and Coke.

4.1.5: Higher-Order Conditioning

Responses learned via classical conditioning can have a sort of domino effect, where one leads to another, so that an already-conditioned stimulus can be added to a new stimulus, creating a kind of "ladder" of new stimuli that elicit the response. For example, let's imagine that your cat learned—through classical conditioning—to come running at the sound of the can opener that you use to open her cat food. The food, of course, was the original UCS, and the can opener was the NS, but when she learned to associate the two, the can opener became the CS. Now, imagine that you keep your can opener in a cupboard that has a squeaky hinge: Every time you open that cupboard, the squeaky hinge signals that the can opener might be coming out. Thus, the squeaky hinge is the new NS, which—when paired with the can opener—becomes a new CS. So, after repeatedly hearing that squeaky hinge precede the appearance of the can opener, the cat learns that the squeaky hinge will lead to food (via the can opener), and will now come running at the sound of the hinge (see Figure 4.3, pg. 124).

4.2: Applications of Classical Conditioning

Objective: **Review some of the areas in real life where Pavlov's classical conditioning techniques may be applied**

The beauty of classical conditioning is that it offers a simple explanation for many responses, from cravings to aversions to learned preferences and attitudes. Moreover, it gives us the tools for eliminating unwanted human behaviors—although Pavlov himself never attempted any therapeutic applications. Instead, it fell to the American behaviorist John Watson to first apply classical conditioning techniques to human problems.

4.2.1: Conditioned Fears: The Notorious Case of Little Albert

More than 90 years ago, John Watson and Rosalie Rayner first demonstrated conditioned fear in a human (Brewer, 1991; Fancher, 1979). In an experiment that

---

Figure 4.3 Higher-Order Conditioning

In higher-order conditioning, a conditioned stimulus provides the foundation for association with a new neutral stimulus, so that the conditioned response begins to occur when associated with a second- or higher-order stimulus.

Higher-order/Second-order conditioning		
Electric can opener	Food	Salivation
+	=	
Conditioned stimulus (CS)	Unconditioned stimulus (UCS)	Unconditioned response (UCR)
Squeaky cabinet door	Electric can opener	Salivation
+	=	
Second-order stimulus	Conditioned stimulus (CS)	Conditioned response (CR)
Squeaky cabinet door	Salivation	
=		
Second-order stimulus	Conditioned response (CR)	

would be considered unethical today, Watson and Rayner (1920/2000) conditioned an infant named Albert to react fearfully to a white laboratory rat. They created the fear response by repeatedly presenting the rat (an NS), paired with the loud sound of a steel bar struck with a mallet, which acted as an aversive UCS. It took only seven trials for "Little Albert" to react with distress at the appearance of the rat (now a CS) alone. Five days later, Watson and Rayner tested Albert again, and found he still showed a fear response to rats, and the response had also generalized from the rat to other furry objects, such as a rabbit, a dog, and a sealskin coat (Harris, 1979).

Most likely, the experiment caused Albert only temporary distress (Harris, 2011), because his fear response diminished relatively quickly over time, prompting Watson and Rayner to periodically renew the fear conditioning. In fact, the need to recondition Albert nearly ended the whole experiment: When Watson decided to "freshen the reaction to the rat" by again striking the steel bar, the noise startled the dog that was in the lab,

which began to bark—frightening not only Little Albert but both experimenters (Harris, 1979).

Unlike Little Albert's short-lived aversion to furry objects, some fears learned under highly stressful conditions can persist for years (LeDoux, 1996). During World War II, the Navy used a gong sounding at the rate of 100 rings a minute as a call to battle stations. For combat personnel aboard ship, this sound became strongly associated with danger—a CS for emotional arousal. The persistent effect of this association was shown in a study conducted 15 years after the war, when Navy combat veterans still gave a strong autonomic reaction to the old "call to battle stations" (Edwards & Acker, 1962). Like those veterans, any of us can retain a readiness to respond to old emotional cues. In fact, a classically conditioned fear response is often the basis of **post-traumatic stress disorder (PTSD)**.

Fortunately, however, classical conditioning also provides tools for eliminating troublesome conditioned fears (Wolpe & Plaud, 1997). One strategy combines extinction of the conditioned fear response with **counterconditioning**, a

Soldiers in combat are at high risk for PTSD, due to their increased exposure to traumatic situations that become associated with certain stimuli. Fortunately, effective treatments—often based on principles of classical conditioning—are available.

therapy that teaches a relaxation response to the CS. In counterconditioning, you pair the CS (the object of the fear) with a positive stimulus that is relaxing, such as holding a loved one's hand, pleasant images, or soothing music, so that exposure to the CS no longer produces anxiety. This approach has been particularly effective in dealing with phobias. As you may be thinking, we ought to consider counterconditioning as part of the treatment plan to help Sabra conquer her fear of flying.

4.2.2: Conditioned Food Aversions

Almost all of us—including your authors—have had bad experiences with certain foods. Phil got sick after eating pork and beans in the grade-school lunchroom, Bob became ill after a childhood overdose of olives, and Vivian lost her lunch after eating chicken salad (formerly one of her favorite meals). In all three cases, we associated our distress with the distinctive sight, smell, and taste of the food—which, for years afterward, was enough to cause feelings of nausea.

Unpleasant as it is, learning to avoid a food (or a beverage) associated with illness has survival value. That's why humans and other animals readily form an association between illness and food—much more readily than between illness and a nonfood stimulus, such as a light or a tone. For example, nothing else present in your authors' environments during their bad food experiences became associated with nausea. Phil didn't become wary of the trays his school lunches were served on, Bob didn't develop a reaction to the highchair in which he developed his olive aversion, and Vivian didn't dodge the friends who were dining with her when she ate the treacherous meal. It was only the foods that became effective **conditioned stimuli**.

4.2.3: Biological Predispositions: A Challenge to Pavlov

Thus, it seems that the CS–UCS connection may be selective, forming more readily in cases when survival cues are present. Scientists John Garcia and Robert Koelling (1966) first identified this new variation on Pavlov's ideas about conditioning when they noticed rats that exposed to radiation—which made them nauseous—wouldn't drink from the water bottles in the chambers where they had received the radiation exposure. Could the rats be associating the taste of the water in those bottles with being sick? Subsequent experiments confirmed their suspicions and led to yet another important discovery. Rats readily learned an association between flavored water and illness, yet the rats could *not* be conditioned to associate flavored water with the pain of an electric shock delivered through a grid on the floor of the test chamber. This makes good sense from an evolutionary perspective, because illness can easily result from drinking (or eating) poisonous substances, but rarely occurs following a sharp pain to the feet. Similarly, rats quickly learned to fear bright lights and noise when they preceded an electric shock—but could *not* learn to connect those light and sound cues with subsequent illness. Such observations suggest that organisms have an inborn preparedness to associate certain stimuli with certain consequences (as in situations where they naturally co-occur), while other CS–UCS combinations are highly resistant to learning.

Conditioned aversions, then, result from both nature and nurture—which was a major insight resulting from the Garcia and Koelling experiments; that is, the tendency to develop taste aversions appears to be "wired in" as part of our biological nature rather than purely learned. It is this biological basis for taste aversions that prompts psychologists to question some aspects of Pavlov's original theory of classical conditioning, which as you know was based purely on learning and environmental stimuli (Rescorla & Wagner, 1972).

Biological predispositions may also impact the timing involved in acquiring a conditioned aversion. For example, food aversions can develop even when the time interval between eating and illness extends over several hours—as compared with just a few seconds in Pavlov's experiments. Again, this suggests that in food aversions, we are not dealing with a simple classically conditioned response as Pavlov understood it but, instead, with a response based as much in nature (biology) as in nurture (learning).

And such biological predispositions go far beyond taste and food aversions. Psychologists now believe that many common fears and phobias arise from *genetic preparedness,* built into us from our ancestral past, prompting us to learn fears of harmful objects such as snakes, spiders, blood, lightning, heights, and closed spaces. Likewise, anxiety about mutilation or other bodily harm can

contribute to fears of seemingly modern objects or situations, like injections, dentistry, or flying.

4.2.4: New Frontiers in Wildlife Management

One innovative team of researchers wondered if classical conditioning could be applied to help settle the longstanding strife between ranchers in Montana and the wolves and coyotes that naturally prey on their livestock (and, thus, threaten their livelihoods). The problem has escalated in recent decades, as environmentalists argue for the reintroduction of native wolves into several regions of North America, and ranchers respond by shooting or trapping the predators in order to protect their herds. Could psychologists offer a better solution by use of **conditioned taste aversion**?

John Garcia (the same researcher who discovered that rats would avoid the water bottles they associated with radiation nausea) and one of his students laced lamb meat with lithium chloride (a salty substance causing temporary nausea), then wrapped it in sheepskins and stashed it on sheep ranches. When roaming coyotes ate these meaty morsels, they became sick and—as predicted—developed a distaste for lamb meat. The result was a 30% to 50% reduction in attacks on ranchers' sheep! So powerful was this aversion that, when captured and placed in a cage with sheep, the coyotes would not get close to it. Some even vomited at the sight of it (Garcia, 1990). A similar, even larger, study in Canada conducted over a 3-year period found success rates averaging an astounding 85% to 90%!

Unfortunately, when government officials tried to implement this strategy, they made the mistake of using too much lithium chloride, which was so salty that it made the coyotes avoid salty tastes instead of lamb. As a result, officials quit using it, not realizing the failure was with their implementation rather than the strategy itself. Recently, though, this promising technique is getting a second chance: Wildlife researcher Bill Given successfully conditioned African lions in Botswana to avoid cattle meat (Platt, 2011). On the basis of that success, and corroborating research in the U.S. and Australia, the U.S. Fish and Wildlife

African lions are one of many predators researchers hope to be able to manage with humane strategies like conditioned taste aversion, rather than resorting to traditional methods of killing the predators.

Service is considering adopting conditioned taste aversion in their Mexican Wolf Recovery Program using a de-worming medication that causes severe, but temporary, nausea (U.S. Fish and Wildlife Service, 2013). If it works, scientists are optimistic that it can be used worldwide as a more humane form of wildlife and predator management (O'Donnell and others, 2010).

4.2.5: Classical Conditioning in Advertising

Who doesn't love the GEICO gecko, the Budweiser Clydesdales, or the Coca-Cola polar bears? These advertising campaigns, and many others like them, masterfully use Pavlov's principles to condition us to associate positive feelings with their products. *Evaluative conditioning* is a special type of classical conditioning that influences many of our preferences—what we learn to like and what we learn to dislike (De Houwer and others, 2001). How? It starts with an appealing UCS such as the charming gecko with the Australian accent—that creates a UCS of liking, accompanied by positive emotions. Pairing the UCS with a NS—in this case, GEICO—means that after seeing the likeable lizard repeatedly associated with the insurance company, your positive feelings toward the gecko are transferred to the insurance company.

This explanation for the power of advertising to influence our attitudes and choices was first documented as early as 1954, in a study now known as the "luncheon technique." Participants in the study were first exposed to a variety of quotations, paintings, types of music, and political slogans, and asked to rate each one according to how much they liked or disliked it. Later, they were exposed to the political slogans again, this time either while enjoying a free lunch, or while smelling an unpleasant odor. Not surprisingly, perhaps, liking of the political slogans increased when they were paired with a free lunch, while slogans paired with the noxious odor suffered accordingly with subsequent lower ratings (Razran, 1954). Since that first experiment, evaluative conditioning has been found to influence our preferences for brands, beverages, art, and a multitude of household products (Sweldens and others, 2010).

CELEBRITY ENDORSEMENTS, PRODUCT PLACEMENT, AND HUMOR IN ADVERTISING Celebrity endorsements also create positive associations, as we often see in marketing for sporting events and a variety of consumer goods and services. Celebrity endorsements have even greater power when the spokesperson is a logical match to the product (such as a basketball star promoting a basketball shoe), but regardless of person–product match, attitudes and preferences conditioned with the help of celebrity endorsements tend to be more resistant to extinction than

typical conditioned responses (Chen and others, 2012; Till and others, 2008). This pattern helps explain why, for example, the allegations of sexual assault that Bill Cosby is facing are so difficult for many people to believe: The public has always known him as the jovial Jell-O Pudding guy and thus felt positive associations toward him.

Somewhat related to the use of celebrities to create positive feelings for products is the concept of "product placement"—featuring a particular product or brand in a movie or television show in hopes of making it more popular. Research examining the usefulness of this strategy finds that it is indeed effective—as long as the viewers like the movie or TV show. If they don't like it, they transfer those same negative feelings to the product that was placed in it. The effects held true even when the product was featured only briefly, or in the background (Redker and others, 2013).

Can you spot the product placement in this still image from *The Voice*? Now that you've learned about this, see how many examples you can find the next time you turn on your TV.

What about humor? About one-third of advertisements employ humor as a conditioning strategy, but research finds that the effects of humor depend on several things.

1. First, humor appeals more to younger audiences and to male audiences, so is best used for products that attract those demographic groups.

2. Second, humor in advertising only works for certain products: Luxury or prestige items, which rely on credibility to maintain their reputation, are undermined by humor. Thus, humor is not likely to be employed in their ads. (When was the last time you saw a funny ad for diamonds or a Porsche?) Snack items and alcoholic beverages, by contrast, are smart choices for humorous ads (De Pelsmacker & Geuens, 2014) (Doritos, anyone?)

3. And third, the type of humor varies with the national culture of the audience: Audiences in the U.K., for

example, prefer satire and understated humor; American and German audiences respond well to humor based on incongruity (think the E-trade baby, who talks from his high chair about stock trading); and Spanish audiences enjoy sentimental humor (Hoffman and others, 2014; Leiss and others, 2005; Toncar, 2001).

Overall, then, humor can be an effective UCS, creating positive emotions toward the product if the advertiser is careful to match the type of humor and the type of product with the target audience (Strick and others, 2009).

We can see, then, how powerfully our attitudes and preferences are being shaped by advertising—and it typically happens without our conscious awareness. Ironically, it is that very lack of conscious attention—our failure to pay attention to the advertisers' efforts to manipulate our feelings—that often creates and maintains the strong conditioned responses we develop based on **evaluative conditioning**. After all, when you see a commercial with beautiful, tanned, hard-bodied people playing on the beach and drinking beer, are you really going to stop and think about how little sense it makes that if you drink a lot of beer you'll look like those people? Probably not. Like the rest of us, you'll probably vicariously enjoy the feeling of the warm sun, the laughter, and the good-looking people, and the next time you're in the grocery store you'll choose whatever brand of beer they were drinking. Thanks, Dr. Pavlov!

4.2.6: Harnessing the Power of Classical Conditioning

Need help getting to sleep, studying, or getting yourself to the gym? Classical conditioning can help, if you can find some positive stimuli to associate with each of those activities. For example, experts recommend keeping your sleeping area quiet and peaceful at all times of the day and night so you learn to associate it with relaxation. Similarly, creating for yourself a certain study space that offers a comfortable chair, pleasant aromas or tastes, or other sensations that positively stimulate you will help you associate those positive stimuli with studying—especially if you allow yourself exposure to these particular stimuli only when you study. And the same principles apply to your efforts to exercise more: If you listen to your favorite music only while working out, chances are you'll start getting that pumped-up, "feels good to exercise" feeling when you hear it—and then you can use it as a stimulus to get yourself to the gym!

What are the big lessons coming out of all this work on classical conditioning? First, *conditioning involves both nature and nurture*; that is, conditioning depends not only on the learned relationship among stimuli and responses but also on the way an organism is genetically attuned to certain stimuli in its environment (Barker and others, 1978;

Dickinson, 2001). What any organism can—and cannot—learn in a given setting is to some extent a product of its evolutionary history (Garcia, 1993). And, second, conditioning has tremendous influence over our attitudes, preferences, and behaviors—especially when we aren't paying attention to the process by which it happens. So, if you want to get better at resisting the forces of classical and evaluative conditioning, pay attention! Research shows that awareness truly does decrease its power. Finally, there are many ways you can use classical conditioning to help motivate yourself toward (or away) from situations, objects, substances, or even people—so, think of a behavior you would like to change, and consider how you can use positive associations to move toward a new (better) behavior, or negative associations to help you move away from the undesirable one. If Pavlov's dogs can do it, so can you!

Psychology Matters

Conditioned Taste Aversions and Chemotherapy

Imagine that your friend Jena is about to undergo her first round of chemotherapy, just to make sure any stray cells from the tumor found in her breast will be destroyed. To her surprise, the nurse enters the lab, not with the expected syringe, but with a dish of licorice-flavored ice cream. "Is this a new kind of therapy?" asks Jena. The nurse replies that it is, indeed, explaining that most patients who undergo chemotherapy experience nausea, which can make them "go off their feed" and quit eating, just when their body needs nourishment to fight the disease. "But," says the nurse, "We have found a way around the problem. If we give patients an unusual food before their chemotherapy, they usually develop an aversion only to that food." She continues, "Did you ever hear of Pavlov's dogs?"

Conditioned food aversions make evolutionary sense, as we have seen, because they helped our ancestors avoid poisonous foods. As is the case with some of our other evolutionary baggage, such ancient aversions can cause modern problems. People undergoing chemotherapy often develop aversions to normal foods in their diets to such an extent that they become malnourished. The aversions are nothing more than conditioned responses in which food (the CS) becomes associated with nausea. Chemotherapy personnel trained in classical conditioning use their knowledge to prevent the development of aversions to nutritious foods by arranging for meals to be withheld just before chemotherapy. And, as in Jena's case, they also present a "scapegoat" stimulus. By consuming candies or ice cream with unusual flavors before treatment, patients develop taste aversions only to those special flavors. For some patients, this practical solution to problems with chemotherapy may make the difference between life and death (Bernstein, 1988, 1991).

Key Question: How Do We Learn New Behaviors by Operant Conditioning?

Core Concept 4.2

In operant conditioning, the consequences of behavior, such as rewards and punishments, influence the probability that the behavior will occur again.

With classical conditioning, you can teach a dog to salivate, but you can't teach it to sit or stay. Why? Salivation is a passive, involuntary reflex, while sitting and staying are much more complex responses that are typically voluntary. To a behavioral psychologist, such voluntary behaviors are controlled by rewards and punishments. And because rewards and punishments play no role in classical conditioning, another important form of learning must be at work—one that psychologists call operant conditioning. (An *operant,* incidentally, is an observable behavior that an organism uses to "operate," or have an effect on, the environment. Thus, if you are reading this book to get a good grade on the next test, reading is an operant behavior.) You might also think of **operant conditioning** as a form of learning in which the *consequences* of behavior encourage behavior change. The core concept for this section puts the idea this way:

> In operant conditioning, the consequences of behavior, such as rewards and punishments, influence the probability that the behavior will occur again.

Rewarding consequences commonly include money, praise, food, or high grades—all of which can encourage the behavior they follow. By contrast, punishments such as pain, loss of privileges, or low grades can discourage the behavior they follow.

As you will see, the theory of operant conditioning is an important one for at least two reasons. First, operant conditioning accounts for a much wider spectrum of behavior than does classical conditioning. And second, it explains *new and voluntary* behaviors—not just reflexive behaviors.

By the end of this section, you will be able to:

4.3   **Explain Skinner's perspective on learning**

4.4   **Examine the ways that reinforcement shapes our behavior**

4.5   **Assess the controversy around using punishment in shaping behavior**

4.6   **Apply operant conditioning to a real-life problem.**

4.7   **Distinguish between the processes of operant and classical conditioning**

4.3: Skinner's Radical Behaviorism

Objective: **Explain Skinner's perspective on learning**

The founding father of operant conditioning, American psychologist B. F. Skinner (1904–1990), based his whole career on the idea that the most powerful influences on behavior are its *consequences*—what happens immediately after the behavior. Actually, it wasn't Skinner's idea originally. He borrowed the notion of behavior being controlled by rewards and punishments from another American psychologist, Edward Thorndike, who demonstrated how hungry animals would work diligently to solve a problem by trial and error when success earned them a food reward. Unlike Pavlov's dogs, Thorndike's cats faced a problem requiring *voluntary* action: how to open the door of a "puzzle box" to get a food reward lying just outside. At first, the cat's attempts seemed random, but gradually, through trial-and-error learning, the attempts that didn't work faded away and the successful behaviors were "stamped in." Thorndike called this the **law of effect** (see Figure 4.4). The idea was that an animal's behavior leads to desirable or undesirable results that influence whether the animal will try those behaviors again. A similar type of trial-and-error learning occurs when you develop a new skill, such as shooting a basketball or playing a new video game.

The first thing Skinner did with Thorndike's psychology, however, was to rid it of subjective and unscientific speculation about the organism's feelings, intentions, or goals. What an animal "wanted" or the "pleasure" it felt was not important for an objective understanding of the animal's behavior. As a radical behaviorist, Skinner refused to consider what happens in an organism's mind, because such speculation cannot be verified by observation—and studying anything
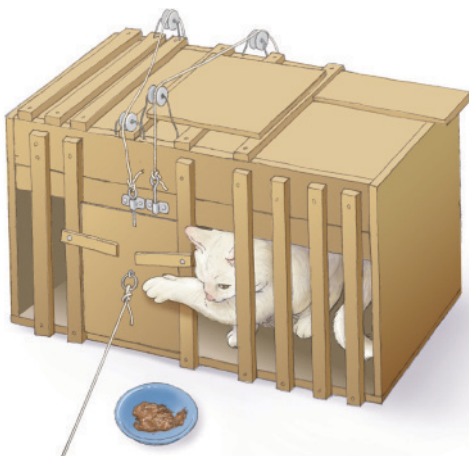
not directly observable threatened the scientific credibility of the fledgling field of psychology. For example, eating can be observed, but we cannot observe the inner experiences of hunger, the desire for food, or pleasure at eating. Thus, according to Skinner, we can observe that someone is eating, but we can't make any assumptions about whether they are hungry or enjoying the food based solely on watching them.

4.4: The Power of Reinforcement

Objective: **Examine the ways that reinforcement shapes our behavior**

Skinner's passionate commitment to the establishment of behaviorism as a legitimate science permeated his work. For example, while we often speak of "reward" in casual conversation, Skinner preferred the more objective term *reinforcer*. Why the concern over terminology? Skinner objected to the term *reward* on the grounds that rewards imply pleasure on the part of the recipient, which in turn assumes knowledge of the organism's inner experience—which was forbidden territory. Reinforcers, on the other hand, act on the behavior (rather than the organism's mind), which *is* directly observable (Winn, 2001). So Skinner defined a **reinforcer** as any stimulus that follows and strengthens a response. Food, money, and sex serve this function for most people; so do attention, praise, or a smile. All these are examples of **positive reinforcement**, which strengthens a response by adding a positive stimulus after the response and making the behavior more likely to occur again.

Most people know about positive reinforcement, of course, but fewer people understand the other major method of strengthening operant responses: reinforcing behavior by *taking away* an unpleasant or aversive stimulus. Psychologists call this **negative reinforcement**. (The word *negative* here is used in the mathematical sense of subtracting or removing, while *positive* means to add or apply. Don't make the common mistake of confusing negative reinforcement with punishment: Instead, remember that reinforcement always *strengthens* behavior, whereas punishment—which we'll discuss shortly—weakens it.) So using an umbrella to avoid getting wet during a downpour is a behavior learned and maintained by negative reinforcement; that is, you use the umbrella to avoid or remove an unpleasant stimulus (getting wet). Likewise, when you buckle your seat belt to stop the annoying sound of the seat-belt buzzer in your car, you are receiving negative reinforcement. And taking a few minutes right now to highlight the distinction between negative reinforcement and punishment in your notes will help you avoid the unpleasant consequence of missing that question on the exam—providing yet another example of the power of negative reinforcement to strengthen behavior!

Figure 4.4 A Thorndike Puzzle Box

The puzzle box tested animals' ability to solve a problem with voluntary action. When a behavior was successful (when the door opened and they got the food), they used this strategy on subsequent trials. This change in behavior based on consequences of previous trials is called the *law of effect*.
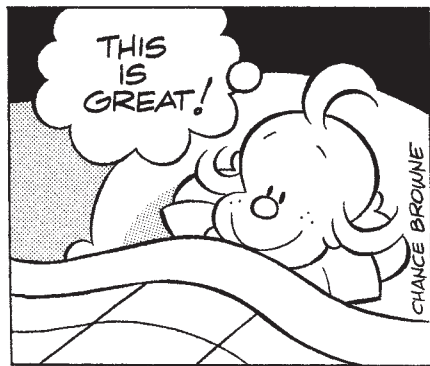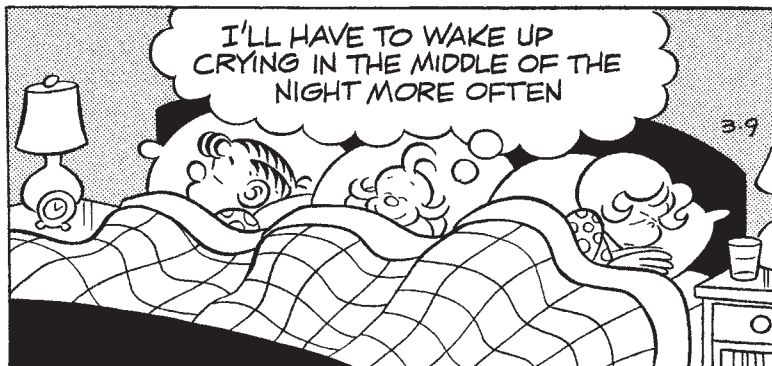
In this cartoon, the child was positively reinforced for crying by being allowed to sleep with her mom and dad. Ironically, this is negative reinforcement for the parents, as they are letting the child sleep in their bed in order to avoid being disturbed by a crying baby.

4.4.1: Vintage Technology: The "Skinner Box"

One of B. F. Skinner's (1956) innovations was a simple device for studying the effects of reinforcers on laboratory animals: a box with a lever an animal could press to obtain food. He called this device an **operant chamber**. (Nearly everyone else called it a "Skinner box," a term he detested.) By programming the chamber to deliver food when a certain lever was pressed, or a particular light pecked (in the case of pigeons—one of Skinner's favorite experimental animals), animals learned quickly what behavior was necessary to obtain food. Since its invention, thousands of psychologists and psychology students have used the apparatus to study operant conditioning. Skinner used variations on the chamber to train animals to perform other behaviors as well. One notable example shows some clever pigeons playing a game you yourself might enjoy. Here is B. F. Skinner himself with a demonstration:

WATCH Skinner's Pigeons in Action

In this original footage from B. F. Skinner's lab, watch pigeons playing Ping-Pong—a result of operant conditioning.

If pigeons can learn to play Ping-Pong, we'll bet you can teach your own pet some useful behaviors. To help you learn more about conditioning behaviors in your pet, your child, your roommate, or yourself, let's examine some of the finer points of operant conditioning.

4.4.2: Contingencies of Reinforcement

The timing and frequency of reinforcement plays a key role in its effect on behavior. So while grade reports delivered two or three times a year may moderately reinforce college and university students for studying, such an infrequent reinforcement schedule has little effect on day-to-day study habits (as you may have discerned). Many professors realize this, of course, and schedule exams and assignments to award grades periodically throughout their courses. In this way, they encourage continual studying rather than one big push at the end of the semester. It's a step in the right direction, but it isn't always enough.

Whether we're talking about college students, *Fortune* 500 CEOs, or laboratory rats, any plan to influence operant learning requires careful attention of the timing and frequency of rewards.

- *How often will they receive reinforcement?*
- *How much work must they do to earn a reinforcement?*
- *Will they be reinforced for every response or only after a certain number of responses?*

As you will see, these decisions will have a significant impact on your results.

4.4.3: Continuous Versus Intermittent Reinforcement

Suppose you want to teach your dog a trick—say, sitting on command. According to behavioral principles, you should begin the training program with a reward for every correct response. Psychologists call this **continuous rein-**

forcement. It's a useful tactic early in the learning process, because rewarding every correct response, while ignoring the incorrect ones, provides quick and clear feedback about which responses are desired.

In addition, continuous reinforcement is useful for shaping complex new behaviors. **Shaping**, often used in animal training, involves the deliberate use of rewards (and sometimes punishments) to encourage closer and closer approximations of the desired behavior. For example, in teaching a dog to sit, you might first say, "Sit!" and simultaneously help the dog into a sitting position—then provide the reinforcement. Before long, the dog will sit on its own without help in order to gain the reinforcement. You have undoubtedly experienced shaping in school, as a teacher taught you to read, write, or play a musical instrument by gradually setting higher standards. By means of shaping, the teacher can continually "raise the bar" or increase the performance level required for earning a reward. In general, then, we can say that *continuous reinforcement is a good strategy for developing and shaping new behaviors.*

As you may have noticed in the video, careful attention and consistency are key to success: you must provide reinforcement immediately after the target behavior is performed. Failing to provide a reward for a correct response could be easily misinterpreted as a signal that the response was incorrect. Another important component is the reinforcer itself: It can lose its power to motivate if it is overused and the learner becomes satiated. In this case, the trainer may have waited until close to feeding time to shape the behavior, in order to ensure that the dog would remain hungry and work for the treats. A good solution for this concern is to offer only small amounts of the reinforcer (just enough to make it meaningful), or to utilize more than one specific reinforcer and vary them each time.

Once the desired behavior becomes well established (for example, when your dog has learned to sit), the demands of the situation change. The learner no longer needs rewards to discriminate a correct response from an incorrect one. At that point, then, it's time to shift to **intermittent reinforcement** (also called *partial reinforcement*), which is the rewarding of some (but not all) correct responses. This less frequent schedule of reinforcement—perhaps, after every third correct response—still serves as an incentive for your dog to sit on command, while helping to avoid satiation. In general, whether we're dealing with people or animals, *intermittent reinforcement is the most efficient way to maintain behaviors that have already been learned* (Robbins, 1971; Terry, 2000). As a practical matter, the transition to intermittent reinforcement can be improved by mixing social reinforcement ("Good dog!") with more tangible rewards (food, for example).

A big advantage of intermittent reinforcement is its resistance to extinction—meaning that behaviors developed with the help of intermittent reinforcement will likely last longer. **Extinction (in operant conditioning)** occurs when reinforcement stops, as when a gambler gives up on a slot machine that never pays off. What makes intermittent reinforcement so resistant to extinction? Imagine two gamblers and two slot machines. One machine inexplicably pays off on every trial, and the other, more typical, machine pays on an unpredictable, intermittent schedule. Now, suppose both devices suddenly stop paying. Which gambler will catch on first? The one who has been rewarded for each push of the button (continuous reinforcement) will quickly notice the change and stop playing, while the gambler who has won only occasionally (on intermittent reinforcement) may continue playing unrewarded for a long time, hoping that the next play will pay off.

4.4.4: Schedules of Reinforcement

Now that we have convinced you of the power of intermittent reinforcement, you should know it occurs in two main forms, or **schedules of reinforcement**.

1. One, the **ratio schedule**, rewards after a certain *number* of responses.

2. The other, known as an **interval schedule**, reinforces after a certain *time interval.*

Let's look at the advantages and disadvantages of each.

RATIO SCHEDULES   Suppose you own a business and pay your employees based on the amount of work they perform—for example, for every item they sell. In that instance, you are maintaining them on a ratio schedule of reinforcement. Ratio schedules, then, occur when rewards depend on the number of correct responses. Psychologists make a further distinction between two subtypes of ratio schedules, fixed ratio and variable ratio schedules. As you read about them in the following paragraphs, refer frequently to Figure 4.5, which provides a visual summary of the results of each type of reinforcement.

Fixed ratio (FR) schedules offer reinforcement after a fixed number of responses—it could be few or many, but in either case it is predictable. This schedule is commonly used in industry, when workers are paid on a piecework basis—a certain amount of pay for a certain amount of production. So if you own a tire factory and pay each worker a dollar for every five tires produced, you are using a fixed ratio schedule. Under this scheme, the amount of work (the number of responses) needed for a reward remains constant, but the faster people work, the more money they get. Not surprisingly, management likes FR schedules because the rate of responding is usually high (Terry, 2000; Whyte, 1972). In other words, it keeps people working quickly. Retail establishments also use fixed ratio schedules when, for example, you receive a free coffee after buying 10 of them from your local coffee

Figure 4.5 Reinforcement Schedules

Schedules of Reinforcement
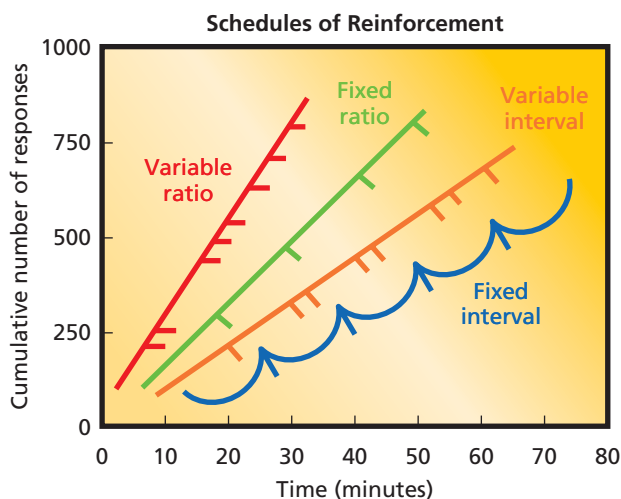
The graph shows typical patterns of responding produced by four different schedules of reinforcement. (Hash marks indicate when reinforcement is delivered.) The steeper angle of the top left lines shows how ratio schedules usually produce more responses in a time period than interval schedules.

shop—which keeps you coming back to the same place for your next coffee.

Variable ratio (VR) schedules are less predictable, as reinforcement comes seemingly at random. Telemarketers work on a VR schedule, because they never know how many calls they must make before they get the next sale. Video poker players also respond on a variable ratio schedule, never knowing when the machine will pay off. In both cases, the continually changing requirements for reinforcement keep responses coming at a high rate—so high, in fact, that the VR schedule usually produces more responding than any other reinforcement schedule. In a demonstration of just how powerful a VR schedule could be, Skinner showed that a hungry pigeon would peck a disk 12,000 times an hour for rewards given, on the average, for every 110 pecks (Skinner, 1953)! Because the pigeon never knew whether the next peck would bring food or not, it kept pecking quickly and without rest, in hot pursuit of the reward.

INTERVAL SCHEDULES Time is of the essence on an interval schedule. In other words, with an interval schedule, reinforcement depends on responses made within a certain *time period* (rather than *number* of responses) (see Figure 4.4). Psychologists distinguish the same two kinds of interval schedules as ratio schedules: *fixed interval* and *variable interval* schedules.

Fixed interval (FI) schedules commonly occur in the work world, appearing as a periodic paycheck or praise from the boss at a monthly staff meeting. A student who studies for a weekly quiz is also reinforced on a fixed interval schedule. In all such cases, the interval does not vary, so

the time period between rewards remains constant. You may have already guessed that fixed interval reinforcement usually results in a comparatively low response rate. Ironically, this is the schedule most widely adopted by business. Even a rat in a Skinner box programmed for a fixed interval schedule soon learns it must produce only a limited amount of work during the interval to get its reward. Pressing the lever more often than required to get the food reward is just wasted energy. Thus, both rats and humans on fixed interval schedules may display only modest productivity until near the end of the interval, when the response rate increases rapidly. (Think of college students facing a term paper deadline, or cramming before a test.) Graphically, in Figure 4.4, you can see the "scalloped" pattern of behavior that results from this flurry of activity near the end of each interval.

Variable interval (VI) schedules are, perhaps, the most unpredictable of all. On a VI schedule, the time interval between rewards (or punishments) varies. The resulting rate of responding can be high, although not usually as high as for the VR schedule. (Think about it this way: You control the frequency of reward on the ratio schedule, because the faster you work, the sooner you reach the magic number required for the reward. On interval schedules, though, no matter how slowly or quickly you work, you cannot make time pass any faster: Until the specified amount of time has passed, you will not receive your reward.) For a pigeon or a rat in a Skinner box, the variable interval schedule may be a 30-second interval now, 3 minutes next, and a 1-minute wait later. In the classroom, pop quizzes exemplify a VI schedule, as do random visits by the boss or drug tests on the job. And watch for responses typical of a VI schedule while waiting for an elevator: Because the delay between pressing the call button and the arrival of the elevator varies each time, some of your companions will press the button multiple times—much like pigeons in a Skinner box—as if more responses within an unpredictable time interval could control the elevator's arrival.

4.4.5: The Role of Biology in Operant Conditioning

It's easy to see how stimuli that meet basic biological needs or desires provide reinforcement: Food reinforces a hungry animal, and water reinforces a thirsty one. Similarly, the opportunity for sex becomes a reinforcer for a sexually aroused organism. Psychologists call these stimuli **primary reinforcers**.

But money or grades provide a different sort of reinforcement: You can't eat them or drink them. Nor do they directly satisfy any physical need. So why do such things reinforce behavior so powerfully? Neutral stimuli, such as money or grades, acquire a reinforcing effect by association with primary reinforcers and so become **conditioned rein-**

forcers or secondary reinforcers for operant responses. The same thing happens with praise, smiles of approval, gold stars, "reward cards" used by merchants, and various kinds of status symbols. In fact, virtually any stimulus can become a secondary or conditioned reinforcer by being associated with a primary reinforcer. With strong conditioning, secondary reinforcers such as money, status, or awards can even become ends in themselves.

The distinction between primary and secondary reinforcers brings up a more subtle point: Like **classical conditioning**, operant conditioning is not pure learning, but has some biological roots—hence our "wired-in" preferences for certain reinforcers (to which "junk" food manufacturers pander with their sweet and fatty treats).

For another example of the power of biology in operant conditioning, we offer the story of Keller and Marian Breland, two students of Skinner's who went into the animal training business, but encountered some unexpected trouble with their trained pigs. As you may know, pigs are smart animals. Thus, the Brelands had no difficulty teaching them to pick up round wooden tokens and deposit them in a "piggy bank." The problem was that, over a period of weeks, these porcine subjects reverted to piggish behavior: They would repeatedly drop the token, root at it, pick it up and toss it in the air, and root it some more. This happened in pig after trained pig. Why? Because rooting is instinctive behavior for pigs. Breland and Breland (1961) found similar patterns in critters as diverse as raccoons, chickens, whales, and cows, and coined the term **instinctive drift** to describe this tendency for innate response tendencies to interfere with learned behavior. No wonder, then, people can't make their cats stop scratching the furniture—or can't altogether avoid the temptation of junk food.

4.4.6: Token Economies

Happily, psychologists have had better luck using tokens with people than with pigs. A *token economy* system is a type of reinforcement that offers tokens for the desired behavior; then, when enough tokens are earned, they can be exchanged for various rewards or privileges. Tokens can be poker chips, marbles, stickers, stamps, fake money, points, checkmarks, or anything else that is easy to implement and keep track of.

Teachers have successfully used token economies with students ranging in age from preschool to college. In young children, token-based strategies like sticker charts and smiley faces, wherein students get a star, a sticker, or a smiley-face when the teacher catches them doing something well, have resulted in rapid improvement of students being on-task. Students can then exchange their stickers (or whatever the token was) for treats or other desirable objects (Doll and others, 2013). In elementary schools, use of tokens has increased completion rates for assignments—each time students complete an assignment, they earn a token, and several tokens can be exchanged for free time (Ruesch & McLaughlin, 1981). When combined with a "cost" for inappropriate behavior—loss of an earned token—results are even better. A study of middle-schoolers who rarely completed their work found that a token system of 1 to 2 points for each answer on a worksheet—which could later be traded for classroom computer time when enough points were earned—raised completion rates from 34% to 79% (Flaman & McLaughlin, 1986)! And in college students, token slips (redeemable for extra points in the class) given to students for asking good questions significantly boosted participation in class discussions (Nelson, 2010).
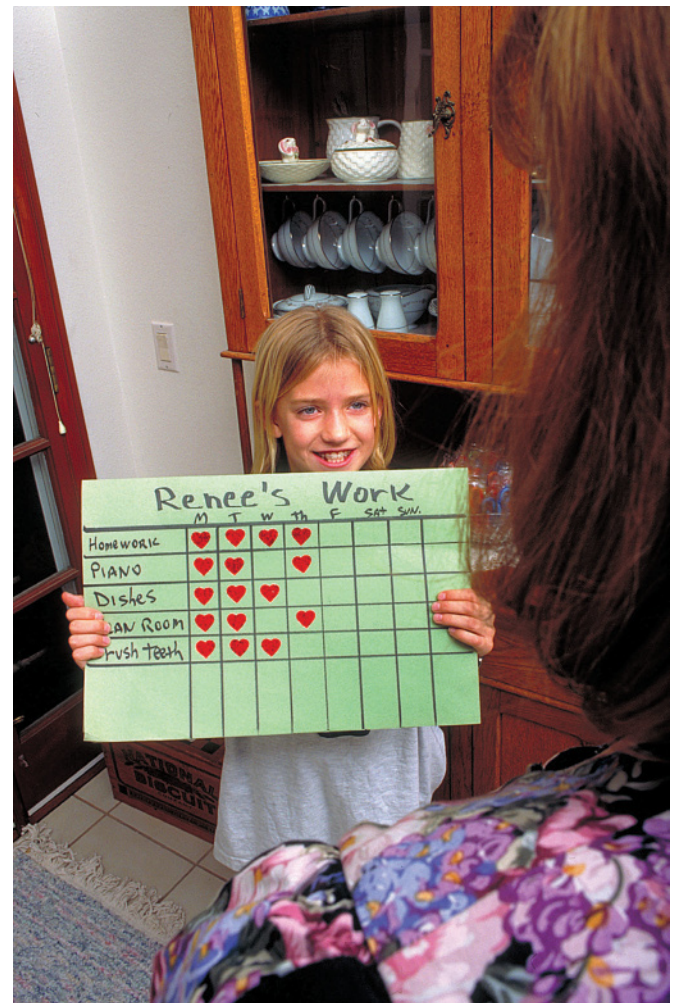
Token economies work for all ages. Think about how you could apply the concept to a goal of your own.

Token economies are effective in home and community-based settings, too. At home, parents can use a token economy system to help motivate their children to complete their homework, do their chores, and engage in socially appropriate behavior (Doll and others, 2013).

Mental health facilities and group homes have tapped the power of conditioned reinforcers to encourage desirable and healthy patient behaviors (Ayllon & Azrin, 1965; Holden, 1978). Alongside other forms of therapy, token economies help patients learn strategies for acting effectively in the world (Kazdin, 1994). Most recently, token economies have been effective in treatment of autism as well (Matson & Boisjoli, 2009).

A major advantage of token economies is their ability to offer both instant rewards and longer-term rewards. So, they can be especially effective in promoting long-term behavior change. One of the challenges of operant conditioning to change certain behaviors (such as eating a healthier diet) is that we must first resist the temptation of instant gratification (like a juicy burger)—and the lure of the immediate is far more powerful for most people than the possibility of a less tangible reward in the future (such as weight loss or clearer skin). Token economies help bridge that gap. So, for example, if you want to eat a healthier diet, try giving yourself some kind of token each time you successfully conquer the urge to eat something unhealthy, and then when you've earned several tokens you can trade them for something you desire (perhaps coffee or a movie with a friend, something new you've been wanting to purchase, or whatever might motivate you). Offering yourself a variety of options for your rewards is helpful, too—that way, you don't become satiated with just one and lose your motivation. With that in mind, how can you use token economies to help yourself achieve some kind of behavioral goal, such as studying more consistently, or exercising regularly?

4.4.7: Preferred Activities as Reinforcers: The Premack Principle

Another way to reinforce behaviors is with desirable activities, using the fun activities as a reward for completing a less desirable task. People who exercise regularly, for example, might use their daily run or fitness class as a reward for getting other, less pleasant tasks done. Likewise, teachers have found that young children will learn to sit still if such behavior is reinforced with the opportunity to run around and make noise later (Homme and others, 1963).Psychologists call this the **Premack principle**, after its discoverer. David Premack (1965) first demonstrated this concept in thirsty rats, which would spend more time running in an exercise wheel if it were followed by an opportunity to drink. Conversely, another group of rats that were exercise deprived, but not thirsty, learned to drink more if drinking were followed by a chance to run in the wheel. In exactly the same way, then, parents can use the Premack principle to get children to make the bed or do the dishes if the task is followed by the opportunity to play with friends.

4.4.8: Reinforcement Across Cultures

The laws of operant learning apply to all creatures with a brain. The biological mechanism underlying reinforcement is, apparently, much the same across species. On the other hand, exactly what serves as a reinforcer varies widely. Our knowledge of primary reinforcers suggests that food for a hungry organism and water for a thirsty one will reinforce behavior because they satisfy basic needs related to survival. But what a particular individual will choose to satisfy basic needs may depend as much on learning as on survival instincts—especially in humans, where secondary reinforcement is so important. For us, culture plays an especially powerful role in determining what will act as reinforcers. So while people in some cultures would find eating a cricket reinforcing, most people of Euro-American ancestry would not. Similarly, disposing of a noisy cricket might seem both sensible and rewarding to a Baptist, yet aversive to a Buddhist. And, just to underscore our point, we note that watching a game of cricket would most likely be rewarding to a British cricket fan—although punishingly dull to most Americans.

Entomophagy is the practice of eating insects as food, which people in some cultures find reinforcing.

So culture shapes preferences in reinforcement, but reinforcement also shapes culture. When you first walk down a street in a foreign city, all the differences that catch your eye are merely different ways people have found to seek reinforcement or avoid punishment. A temple houses cultural attempts to seek rewards from a deity. Clothing may reflect attempts to seek a reinforcing mate or to feel comfortable in the climate. And a culture's cuisine evolves from learning to survive on the native plant and animal resources. In this sense, then, culture is a set of behaviors originally learned by operant conditioning and shared by a group of people.

Figure 4.6 Negative Reinforcement and Punishment Compared
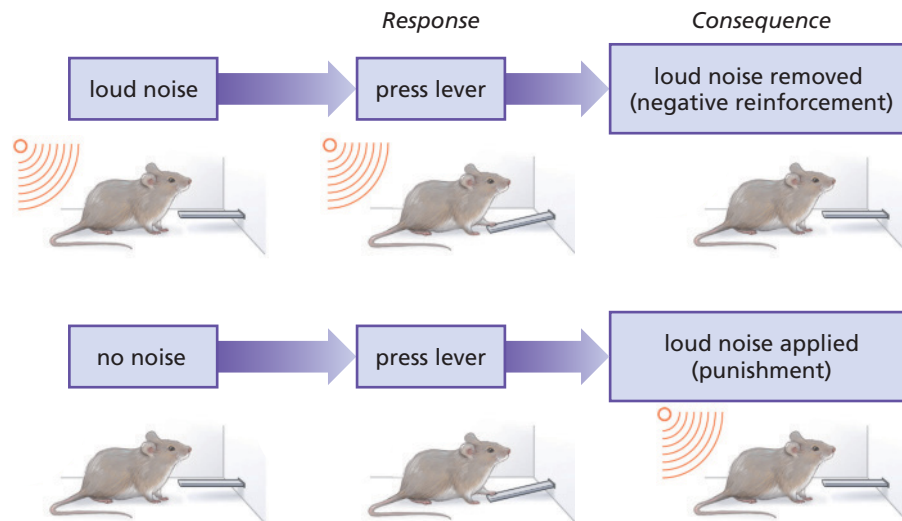
4.5: The Puzzle of Punishment

Objective: **Assess the controversy around using punishment in shaping behavior**

Punishment as a means of influencing behavior poses several difficulties, as schoolteachers and prison wardens will attest. Ideally, we might think of **punishment** as the opposite of reinforcement: an *aversive* consequence used to *weaken* the behavior it follows. And like reinforcement, punishment comes in two main forms.

1. **Positive punishment** requires application of an aversive stimulus—as, when you touch a hot plate, the painful consequence reduces the chance of you repeating that behavior.
2. The other main form of punishment, **negative punishment**, results from the removal of a reinforcer—as when parents take away a misbehaving teen's car keys.

(You can see, then, that the terms *positive* and *negative*, when applied to punishment, operate the same way they do when applied to reinforcement: Positive punishment adds something, and negative punishment takes something away.) Technically, however—and this is one of the problems of punishment—an aversive stimulus is punishing only if it actually weakens the behavior it follows. In this sense, then, spankings or speeding tickets may or may not be punishment, depending on the results.

4.5.1: Punishment versus Negative Reinforcement

You have probably noted that punishment and negative reinforcement both involve unpleasant stimuli. How can you distinguish between the two? Let's see how punishment and negative reinforcement differ, using the following examples (see Figure 4.6).

Punishment, then, *decreases* a behavior or reduces its probability of recurring. In contrast, negative reinforcement—like positive reinforcement—always *increases* a response's probability of occurring again. And don't forget the descriptors *positive* and *negative* mean "add" and "remove"—as descriptors in operant conditioning, they have nothing to do with "good," or "bad." Thus, both positive reinforcement and positive punishment involve administering or "adding" a stimulus. On the other hand, negative reinforcement and negative punishment always involve withholding or removing a stimulus.

And please keep in mind one final important point: We can often predict what effect a particular consequence will have, but the only way to know for sure whether it will be a reinforcer or a punisher is to observe its effect on behavior. For example, although we might guess that a spanking would punish a child, the attention might actually serve as a reinforcer to strengthen the unwanted behavior.

For a concise summary of the distinctions between positive and negative reinforcement and punishment, (see Table 4.1, pg. 136).

WRITING PROMPT

Distinguishing Between Punishment and Negative Reinforcement

Give an example from your own life of a time that negative reinforcement influenced your behavior. Explain your answer.

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

Table 4.1 Four Kinds of Consequences

		Apply (add) Stimulus (positive)	Remove (subtract) Stimulus (negative)
What is the effect of the stimulus (consequence) on behavior?	The probability of the behavior increases.	**Positive reinforcement** Example: An employee gets a bonus for good work (and continues to work hard).	**Negative reinforcement** Example: You take aspirin for your headache, and the headache vanishes (so you take aspirin the next time you have a headache).
	The probability of the behavior decreases.	**Positive punishment** Example: A speeder gets a traffic ticket (and drives away more slowly).	**Negative punishment** Example: A child who has stayed out late misses dinner (and comes home early next time).

4.5.2: Uses and Abuses of Punishment

Many societies rely heavily on punishment and the threat of punishment to keep people "in line." We fine people, spank them, and give them bad grades, parking tickets, and disapproving looks. Around the world and throughout history, cultures have ritually engaged in shunning, stoning, flogging, imprisonment, and a veritable smorgasbord of creative methods of execution in attempts to deter unacceptable behavior. Currently, American jails and prisons contain about 1.5 million people, while the United States currently maintains one in every 35 of its citizens in jail or prison or on probation or parole (Glaze & Kaeble, 2014). (Believe it or not, these figures have decreased in recent years.)

Why do we use punishment so often? For one, it can sometimes produce an immediate change in behavior. For another, punishers may feel satisfaction by delivering the punishment, sensing they are "settling a score," "getting even," or making the other person "pay." This is why we speak of revenge as being "sweet," a sentiment that seems to underlie public attitudes toward the punishment of lawbreakers (Carlsmith, 2006).

But punishment—especially the sort of punishment involving pain, humiliation, or imprisonment—usually doesn't work as well in the long run (American Psychological Association, 2002). Punished children may continue to misbehave; reprimanded employees may sabotage efforts to meet production goals. And people still commit crimes around the world, despite a variety of harsh punishment tactics. So why is punishment so difficult to use effectively? There are several reasons.

PROBLEMS WITH PUNISHMENT

1. First, *punishment—unlike reinforcement—must be administered consistently.* Drivers will observe the speed limit when they know the highway patrol is watching; Andre will refrain from hitting his little brother when a parent is within earshot; and you will probably give up your wallet to a mugger who points a gun at you. But the power of punishment to suppress behavior usually disappears when the threat of punishment is removed (Skinner, 1953). If punishment is unlikely, it does not act as a deterrent—and in most cases, it is impossible to administer punishment consistently. Intermittent punishment is far less effective than punishment delivered after every undesired response: In fact, *not punishing* an occurrence of unwanted behavior can have the effect of rewarding it—as when a supervisor overlooks the late arrival of an employee. In general, you can be certain of controlling someone's behavior through punishment or threat of punishment only if you can control the environment (and thus administer the punishment) all the time. Such total control is rarely feasible.

2. Second, *the lure of rewards may make the possibility of punishment seem worth the price.* This may be one factor impacting drug dealing—when the possibility of making a large amount of money outweighs the possibility of prison time (Levitt & Dubner, 2005). And, in a different way, the push-pull of punishment and rewards also affects dieters, when the short-term attraction of food may overpower the unwanted long-term consequences of weight gain. So if you attempt to control someone's behavior through punishment, you may fail if you do not eliminate the rewards as well.

3. Third, *punishment triggers escape or aggression.* When punished, an organism's survival instinct prompts it to flee from or otherwise avoid further punishment. And if escape is blocked, aggression can result. Corner a wounded animal, and it may savagely attack you. Put two rats in a Skinner box with an electrified floor grid, and the rats will attack each other (Ulrich & Azrin, 1962). Put humans in a harsh prison environment, and they may riot or engage in other aggressive acts—or, if they are prison guards, they may abuse the prisoners (Zimbardo, 2004b, 2007).

4. Further, in a punitive environment, whether it be a prison, a school, a workplace, or a home, *people learn that punishment and aggression are legitimate means of influencing others*. The punishment–aggression link also explains why abusing parents so often come from abusive families, and why aggressive delinquents frequently come from homes where aggressive behavior

Prison riots and other aggressive behavior may result from highly punitive conditions.

is commonplace (Golden, 2000). Unfortunately, the well-documented relationship between punishment and aggression remains widely unknown to the general public.

5. Here's a fifth reason why punishment is so often ineffective: *Punishment makes the learner fearful or apprehensive, which inhibits learning new and more desirable responses.* Unable to escape punishment, an organism may eventually give up its attempts at flight or fight and surrender to an overwhelming feeling of hopelessness. This passive acceptance of a punitive fate produces a behavior pattern called *learned helplessness* (Overmier & Seligman, 1967). In people, this reaction can produce the mental disorder known as depression (Terry, 2000). If you want to produce a constructive change in attitudes and behavior, learned helplessness and depression are undesirable outcomes. The same goes for aggression and escape. By contrast, individuals who have not been punished feel much freer to experiment with new behaviors.

6. Yet a sixth reason why punitive measures may fail: *Punishment is often applied unequally*, even though that violates our standards of fair and equal treatment. For example, parents and teachers punish boys more often than girls (Lytton & Romney, 1991). Then, too, children (especially grade school children) receive more physical punishment than do adults. And, to give one more example, our schools—and probably our society at large—more often punish members of minority groups than members of the majority (Hyman, 1996).

7. And, perhaps most importantly, *punishment fails to teach learners what to do differently*, because it focuses attention on what *not* to do. The best it can do, then, is to shut down an undesirable behavior—it offers no clues for alternative, more desirable actions.

4.5.3: Does Punishment Ever Work?

In limited circumstances, punishment can work remarkably well. For example, punishment can halt the self-destructive behavior of children with autism, who may injure themselves severely in some cases by banging their heads or chewing the flesh off their fingers. A mild electric shock or a splash of cold water in the face can quickly stop such unwanted behavior, although effects may be temporary (Holmes, 2001). It can also be combined effectively with reinforcement—as when students receive good grades for studying and failing grades for neglecting their work. If you have a puppy chewing on your favorite shoe, you can combine punishment with reinforcement by taking away the shoe and saying, "NO!" and immediately replacing the shoe with an acceptable chew toy, and then praising the puppy when he chews on that instead.

Punishment is also more likely to be successful if it involves a *logical consequence:* a consequence closely related to the undesirable behavior—as contrasted with an *un*related punishment, such as spanking or grounding. So, if a child leaves a toy truck on the stairs, a logical consequence might be to lose the toy for a week. To give another example, a logical consequence of coming home late for dinner is getting a cold dinner.

Rather than a purely punitive approach to misbehavior, research supports the combination of logical consequences, extinction, and the rewarding of desirable alternative responses. When you do decide to use punishment, it should meet the following conditions:

- *Punishment should be consistent*—administered every time the unwanted response occurs. When bad behavior goes unpunished, the effect can actually be rewarding—thus making the behavior more resistant to change.

- *Punishment should be swift*—that is, immediate. Any delay will impair its effectiveness, so "You'll get spanked when your father gets home" is a poor punishment strategy.

- *Punishment should be limited in duration and intensity*—meaningful enough to stop the behavior but appropriate enough to "make the punishment fit the crime."

- *Punishment should clearly target the behavior* and be a *logical consequence of the behavior* rather than an attack on character of the person (humiliation, sarcasm, or verbal abuse) or physical pain.

- *Punishment should be limited to the situation in which the response occurred.*

- *Punishment should not give mixed messages* to the punished person (such as, "You are not permitted to hit others, but I am allowed to hit you").

- *The most effective punishment is usually negative punishment,* such as loss of privileges, rather than the application of unpleasant stimuli such as a spanking.

4.6: A Checklist for Modifying Operant Behavior

Objective: **Apply operant conditioning to a real-life problem**

Think of someone whose behavior you would like to change. For the sake of illustration, let's consider your niece Maddy's temper tantrums, which seem to be occurring with greater frequency—sometimes even when you take her out in public. Operant conditioning offers a selection of tools that can help: positive reinforcement on a variety of schedules, plus negative reinforcement, extinction, and punishment.

- Since **positive reinforcement** is always good bet, identify and encourage a desirable behavior in place of the unwanted behavior. The most effective parents and teachers often do this by shifting the child's attention to some other reinforcing activity. When taking her to the grocery store, for example, involve her in simple choices between, say, the green apples or the red ones. This keeps her interested, which will help prevent a temper tantrum, and also gives you an opportunity to provide positive reinforcement for her help ("Good idea, Maddy—I like the red ones, too!") And don't overlook the Premack principle, which lets Maddy do something she enjoys if she behaves for a certain period of time. (Incidentally, this is where *shaping* comes into play: To be effective, you must set goals for Maddy that are within her reach, so she can achieve them and reap the benefits of positive reinforcement. So, you might aim for just 20 minutes of good behavior at first, then—after she has achieved it and been rewarded—gradually work up to longer and longer periods of time.) Use **continuous reinforcement** at first, then scale back to a combination of **intermittent reinforcement** schedules to keep her tantrum free.

- **Negative reinforcement** can be useful too. If, for example, one of Maddy's household chores is taking out the trash, tell her you'll do it for her if she can play nicely with her sister (with no temper tantrums) that afternoon. That way, she avoids something she'd rather not do (taking out the trash), which reinforces her for good behavior. You may have enjoyed negative reinforcement yourself if you've had a professor who let you opt out of the final exam if your other exam scores were high enough, or skip a homework assignment if you'd achieved some other important goal in the class. There are less effective applications of negative reinforcement, however. For example, parents commonly use nagging to try to get their children to, say, clean their rooms. In this scenario, parents nag until the room gets cleaned—thus, the child cleans the room to stop or to avoid the nagging. While this may get the job done, it's generally not pleasant for anyone. Instead, behaviorists recommend parents create positive reinforcers to provide incentives for the kids to clean their rooms. By offering meaningful rewards, using token economies, or using the Premack principle to encourage desired behaviors, you accomplish the same behavioral change without the tension that typically accompanies nagging or other aversive stimuli.

- **Extinction** guarantees a solution, but only if you control all the reinforcers. In Maddy's case, extinction comes from not giving in to the temper tantrum and not giving her what she wants. Instead, you simply allow the tantrum to burn itself out. This can be a challenge, since it means you must suffer through the tantrum, maybe even feeling embarrassed if she's throwing the tantrum in public. (Have you ever wondered why children seem intuitively to pick the most public places for such displays? Perhaps because they quickly learn they will be "rewarded" with candy or attention from an exasperated parent who just wants them to stop—which is another misuse of negative reinforcement!) Another problem with extinction, however, is that it may take a while, so extinction is not a good option if the subject is engaging in dangerous behavior, such as playing in a busy street.

- **Punishment** may be tempting, but we have seen that it usually produces unwanted effects, such as aggression or escape. In addition, punishment often damages the relationship between the punisher and the person being punished and is difficult to employ with unfailing consistency. If you do decide to punish Maddy for her tantrums, make it a logical consequence, such as a "time out" in her room if she is acting up at home—and doing so swiftly, and without undue harshness.

The lesson, then, is to combine several tactics. In Maddy's case, this involves both reinforcing her desirable behaviors (with positive and negative reinforcement), and using extinction or logical consequences on her undesirable ones. We encourage you to try these strategies for yourself the next time you are dealing with someone whose behavior is undesirable. And remember: The behavior you may want to change could be your own!

4.7: Operant and Classical Conditioning Compared

Objective: **Distinguish between the processes of operant and classical conditioning**

Now that we have examined the main features of operant and **classical conditioning**, let's compare them side by side. In general, the *consequences* of behavior—especially rewards and punishments—distinguish operant conditioning from

classical conditioning. More specifically, we can focus on three notable differences between the two types of learning.

4.7.1: Is the Behavioral Response Before or After the New Stimulus?

In classical conditioning, the new stimulus is the NS—which, when paired with the UCS, produces the response in the form of a behavior. So, the new stimulus comes *before* the behavioral response. In operant conditioning, though, we offer the new stimulus *after* the behavioral response, in the form of a reward or punishment. So, one way to distinguish between classical and operant conditioning to identify if the behavior occurs before or after the stimulus: If the behavior comes at the end of the process, we are dealing with classical conditioning, whereas if it starts the process, operant conditioning is at work.

But note this point of potential confusion: The same stimulus can play different roles, depending on the type of conditioning. So don't let the nature of the stimulus fool you. As the example in Figure 4.7 shows, food acts as a reward in operant conditioning, but in classical conditioning, food is an UCS. The important thing to note is that in classical conditioning the food comes *before* the behavioral response—and therefore it cannot serve as a reward. In

operant conditioning, though, its placement *after* the behavioral response is what makes it a reward.

4.7.2: Is the Behavior Voluntary or Reflexive?

Another way to distinguish between classical and operant conditioning is to consider the behavior itself. Is it a reflexive behavior, such as salivating, feeling ill, or something connected to some other biological "wired-in" pattern? If so, you're dealing with classical conditioning, which typically begins with a biological stimulus–response pattern (such as physical affection stimulating happiness, or a loud noise

---

Figure 4.7 The Same Stimulus Plays Different Roles in Classical Conditioning and Operant Conditioning

| Unconditioned stimulus (food) | → | Unconditioned response (salivation to food) |

| Conditioned stimulus (tone) | → | Conditioned response (salivation to tone previously paired with food) |

Classical Conditioning

| Operant behavior (sitting up) | → | Reinforcing stimulus (food) |

Operant Conditioning
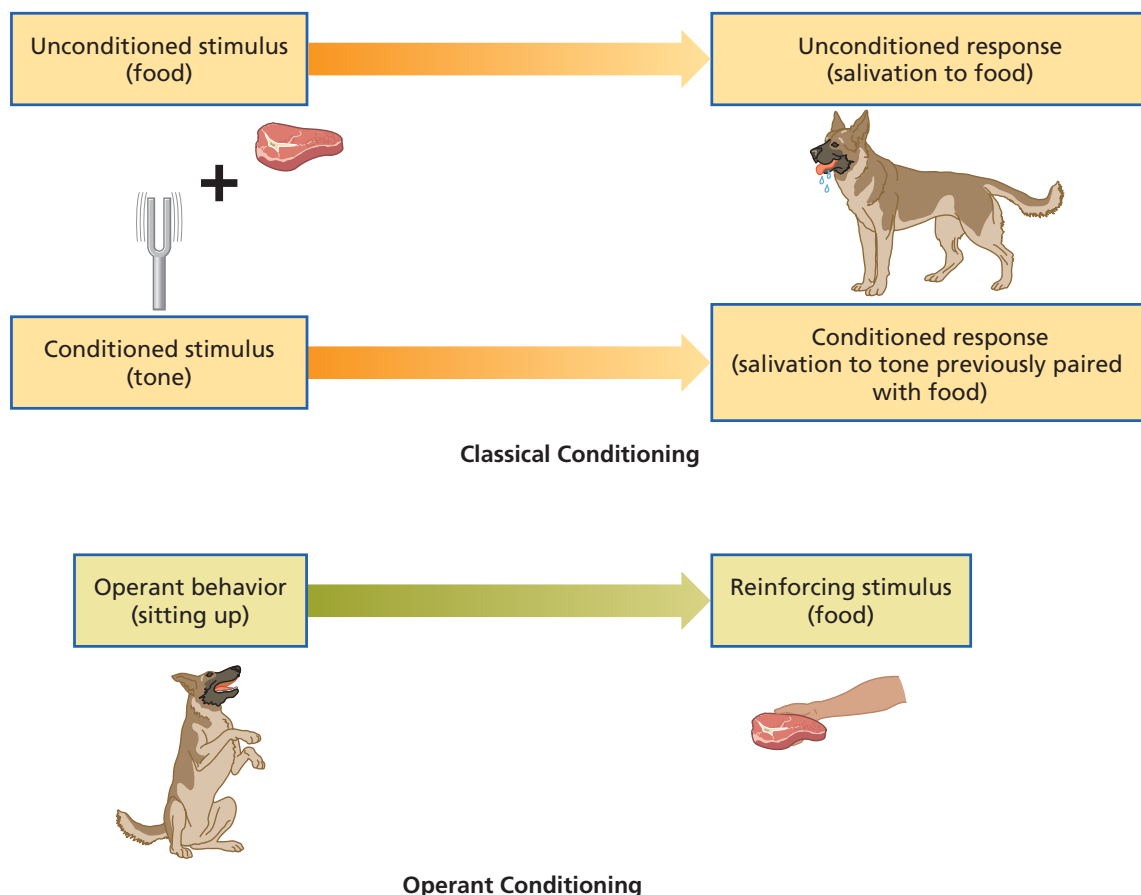
stimulating a cringe or fear). The learning comes when we associate a novel stimulus that is *not* "wired in" with the biological stimulus, thus producing the same old response—but this time to a new stimulus.

In contrast, operant behavior is *not* based on an automatic reflex action, as was the dog's salivation or Little Albert's crying. Instead, it is a behavior that developed voluntarily, by making an active choice to respond to a reward or punishment. Sitting on command to get a treat is a choice the dog makes in order to obtain the food reward. Studying to get a good grade is a choice you make in order to obtain the academic reward. Thus, classically conditioned responses are generally involuntary and unconscious, while operant behaviors are conscious and voluntary. To paraphrase a proverb: You can stimulate a dog to salivation (a reflex), but you can't make it eat (an operant behavior).

4.7.3: New Behavior or Existing Behavior?

Another difference between the two types of conditioning is the kinds of behaviors they target (see Table 4.2). Operant conditioning encourages *new behaviors*—making beds, going to work, developing healthy eating habits, or studying for an exam. Classical conditioning, on the other hand, emphasizes eliciting *old responses to new stimuli*—such as salivating at the sound of a bell or flinching at the sound of a dentist's drill. So, with classical conditioning, there is nothing new about the behavior—it is simply connecting an existing behavior to a new stimulus.

You may have also noticed that extinction works slightly differently in the two forms of learning as well. In classical conditioning, extinction requires withholding the UCS, which makes sense because it severs the connection between the two stimuli. In operant conditioning, though, extinction results from withholding the reinforcer, because without the reward or punishment, there is no reason to perform the behavior.

4.7.4: How They Work Together

But don't make the mistake of thinking that classical and operant conditioning are competing explanations for learning.

They can be complementary. In fact, responses originally learned by classical conditioning will often be maintained over time by operant conditioning. How? Consider a snake phobia. Suppose the fear of snakes was originally learned by classical conditioning when a snake (CS) was paired with a frightening UCS (someone yelling, "Look out!"). Once the phobic response is established, it could be maintained and strengthened by operant conditioning. Every time you avoid the fear object, the reduction of your anxiety acts as a negative reinforcer (thus a positive consequence) for the avoidant behavior—further strengthening the phobia. You may also receive positive reinforcement, in the form of comfort or attention, from friends or family who are nearby (see Figure 4.8, p. 141).

Psychology Matters

Using Psychology to Learn Psychology

You may have tried the **Premack principle** to encourage yourself to study more, perhaps by saving TV time or a trip to the refrigerator until your homework was done. It works for some people, but if it doesn't work for you, try making the studying itself more enjoyable and more reinforcing.

For most of us, getting together with people we like is reinforcing, regardless of the activity. So, make some (not all) of your studying a social activity. For example, schedule a time when you and another classmate or two can get together to identify and discuss important concepts, and try to predict what will be on the next test.

And don't focus just on vocabulary. Rather, try to discover the big picture—the overall meaning of each section of the chapter. The core concepts are a good place to start. Then you can discuss with your friends how the details fit into the core concepts. You will most likely find that the social pressure of an upcoming study group (serving as an **intermittent reinforcer**) will help motivate you to get your reading done and identify murky points. When you get together for your group study session, you will discover that explaining what you have learned strengthens your own understanding. In this way, you reap the benefits of a series of reinforcements: time with friends, enhanced learning, and better performance on the exam.

Table 4.2 Classical and Operant Conditioning Compared

Classical Conditioning	Operant Conditioning
Behavior is controlled by stimuli that *precede* the response (by the **CS** and **UCS**).	Behavior is controlled by consequences (rewards, punishments, and the like) that *follow* the response.
No reward or punishment is involved (although pleasant and aversive stimuli may be used).	Typically involves reward (reinforcement) or punishment.
Through conditioning, a new stimulus (the CS) comes to produce "old" (reflexive) behavior.	Through conditioning, a new stimulus (a reinforcer) produces new behavior.
Extinction is produced by withholding the UCS.	Extinction is produced by withholding reinforcement.
Learner is passive (responds reflexively): Responses are involuntary; that is, behavior is *elicited* by stimulation.	Learner is active (operant behavior): Responses are voluntary; that is, behavior is *emitted* by the organism.

Figure 4.8 Classical and Operant Conditioning Can Work Together

A response originally learned through classical conditioning can be maintained and strengthened by operant reinforcement.

Classical Conditioning   Operant Conditioning
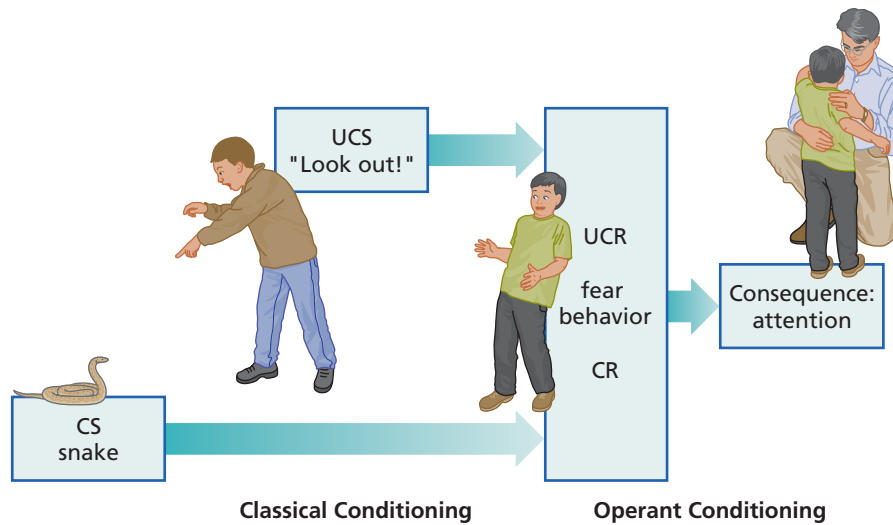
Key Question: How Does Cognitive Psychology Explain Learning?

> **Core Concept 4.3**
>
> **According to cognitive psychology, some forms of learning must be explained as changes in mental processes rather than as changes in behavior alone.**

According to biologist J. D. Watson's (1968) account in *The Double Helix*, he and Francis Crick cracked the genetic code one day in a flash of insight following months of trial and error. You may have had a similarly sudden, if less famous, insight when solving a problem of your own—maybe you had been working on it for a while, then all of a sudden the solution became clear. Such events present difficulties for strict behaviorists, because they obviously involve learning yet they are hard to explain in terms of Pavlovian or Skinnerian conditioning.

Many psychologists believe that an entirely different process, called *cognitive learning,* is responsible for such flashes of insight. From a cognitive perspective, learning does not always show itself immediately in behavior. Instead, learning can be reflected in mental activity alone— as the core concept for this section says:

> According to cognitive psychology, some forms of learning must be explained as changes in mental processes rather than as changes in behavior alone.

Let's see how cognitive psychologists have approached this task of examining the covert mental processes behind

learning. To do so, we first take you on a trip to the Canary Islands, off the coast of northern Africa.

By the end of this section, you will be able to:

4.8 **Describe how Kohler discovered insight learning**

4.9 **Examine the way Edward Tolman's experiments on cognitive maps and latent learning challenged existing theories of behavior**

4.10 **Describe Bandura's contributions to our understanding of learning**

4.11 **Examine the brain processes involved in learning**

4.8: Insight Learning: Köhler in the Canaries with Chimps

Objective: **Describe how Kohler discovered insight learning**

Isolated on the island of Tenerife during World War I, Gestalt psychologist Wolfgang Köhler *(KER-ler)* had time to think long and hard about learning. Disenchanted with the behaviorists' explanation for learning, Köhler sought to develop his own theories. To his way of thinking, psychology had to recognize mental processes as an essential component of learning, even though mental events had been spurned as subjective speculation by the behaviorists. To press his point, Köhler took advantage of a primate research facility constructed by the German government

Figure 4.9 Insight Learning

The sort of learning displayed by Köhler's chimps defied explanation by the behaviorists --in terms of classical conditioning and operant conditioning. Here, you see Sultan, Köhler's smartest animal, solving the problem of getting the bananas suspended out of reach by stacking the boxes and climbing on top of them. Köhler claimed that Sultan's behavior demonstrated insight learning.
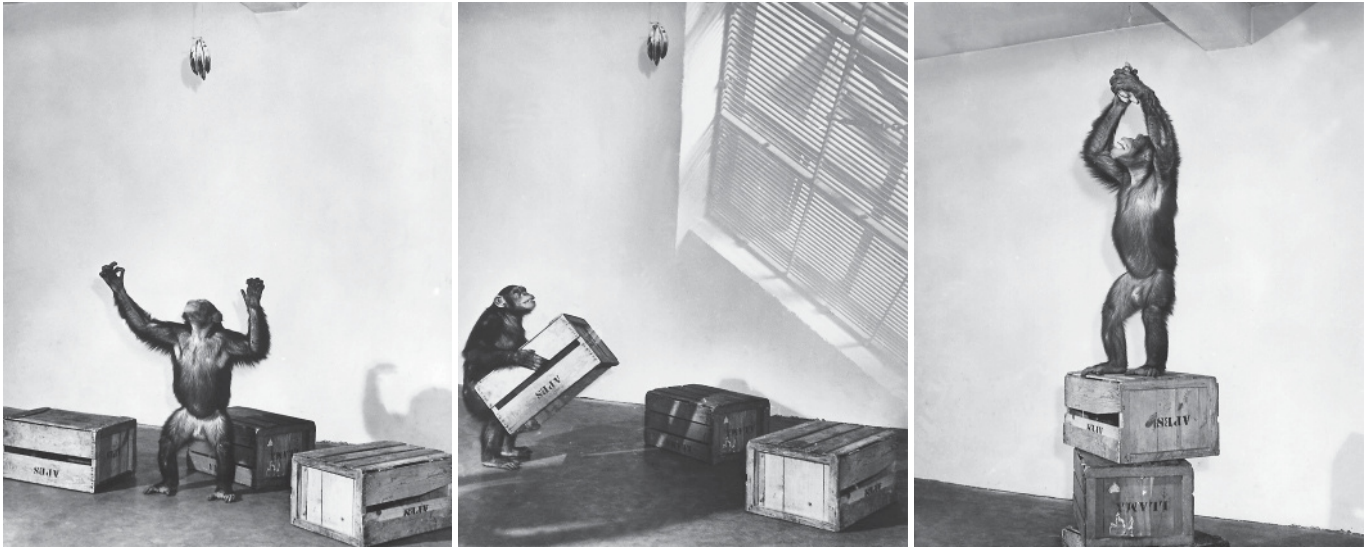
on Tenerife. There, he contrived experiments based on observable behavior that aimed to reveal measurable elements of cognitive learning (Sharps & Wertheimer, 2000; Sherrill, 1991).

In a series of famous studies, Köhler showed that chimps could learn to solve complex problems, not just by trial and error (an explanation favored by behaviorists) but by "flashes of insight" that combined simpler responses learned previously. One such experiment involved Sultan, a chimp that had learned to pile up boxes and scramble on top of them to reach fruit suspended high in his cage, and also to use sticks to obtain fruit that was just out of reach. When Köhler presented Sultan with a novel situation that combined the two problems—with fruit suspended even higher in the air—the chimp first attacked it unsuccessfully with sticks in trial-and-error fashion. Then, in apparent frustration, Sultan threw the sticks away, kicked the wall, and sat down. According to Köhler's report, the animal then scratched his head and began to stare at some boxes nearby. After a time of apparent "thinking," he suddenly jumped up and dragged a box and a stick underneath the fruit, climbed on the box, and knocked down his prize with the stick (see Figure 4.9).

Remarkably, Sultan had never before seen or used such a combination of responses. This behavior, Köhler argued, was evidence that animals were not just mindlessly using conditioned responses but were learning by *insight:* by reorganizing their *perceptions* of problems. He ventured that such behavior shows how apes, like humans, learn to solve problems by suddenly perceiving familiar objects in new forms or relationships—a decidedly mental

process rather than a merely behavioral one. He called this insight learning (Köhler, 1925). **Insight learning**, said Köhler, results from an abrupt reorganization of the way a situation is perceived.

Behaviorism had no convincing explanation for Köhler's demonstration. Neither classical nor operant conditioning could account for Sultan's behavior in stimulus–response terms. Thus, the feats of Köhler's chimps demanded the cognitive explanation of perceptual reorganization.

4.9: Cognitive Maps: Tolman Finds Out What's on a Rat's Mind

Objective: Examine the way Edward Tolman's experiments on cognitive maps and latent learning challenged existing theories of behavior

Not long after Köhler's experiments with chimpanzees, the rats in Edward Tolman's lab at Berkeley also began behaving in ways that flew in the face of accepted behavioral doctrine. They would run through laboratory mazes as if following a mental "map" of the maze, rather than mindlessly executing a series of learned behaviors. Let's see how Tolman managed to demonstrate these "mindful" responses.

4.9.1: Mental Images—Not Behaviors

If you have ever walked through your house in the dark, you have some idea what Tolman meant by "cognitive

Figure 4.10 Using Cognitive Maps in Maze Learning

Rats used in this experiment preferred the direct path (Path 1) when it was open. When it was blocked at A, they preferred Path 2. When Path 2 was blocked at B, the rats usually chose Path 3. Their behavior indicated that they had a cognitive map of the best route to the food box.
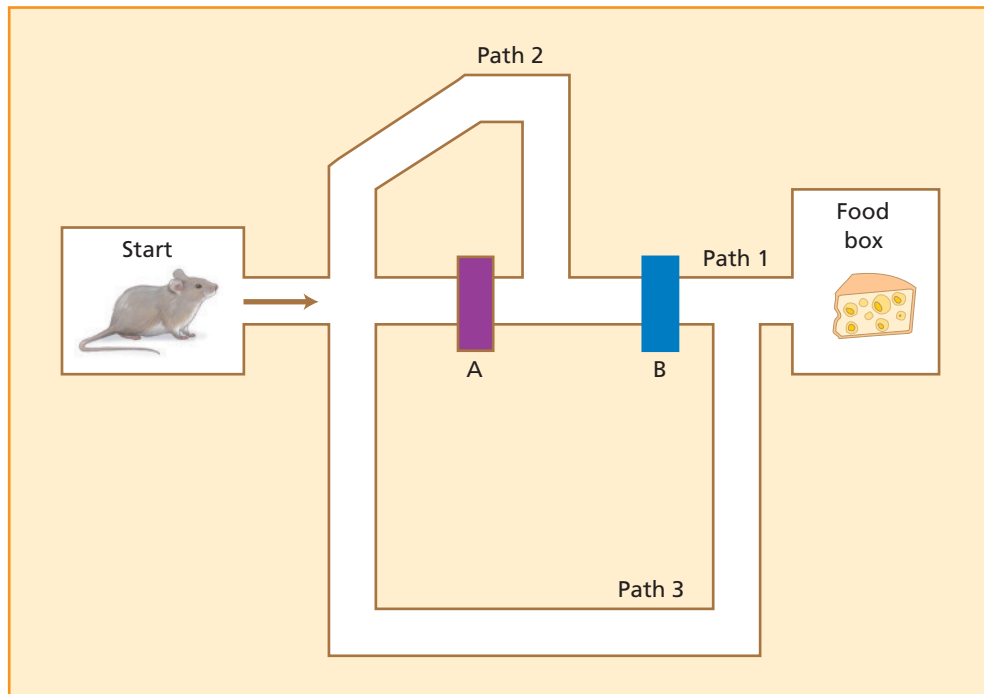
map." Technically, a **cognitive map** is a mental image an organism uses to navigate through a familiar environment. But could a simple-minded creature like a rat have such complex mental imagery? And, if so, how could the existence of these cognitive maps be demonstrated? A cognitive map, Tolman argued, was the only way to account for a rat quickly selecting an alternative route in a maze when the preferred path to the goal is blocked. In fact, rats will often select the shortest detour around a barrier, even though taking that particular route was never previously reinforced. Rather than blindly exploring different parts of the maze through trial and error (as behavioral theory would predict), Tolman's rats behaved as if they had a mental representation of the maze. (Figure 4.10 shows the arrangement of such a maze.)

In further support of his claim that learning was *mental,* not purely behavioral, Tolman offered another experiment: After his rats had learned to run a maze, he flooded it with water and showed that the rats were quite capable of swimming through the maze. Again, this demonstrated what the animals had learned was a *concept,* not just behaviors. Instead of learning merely a sequence of right and left turns, Tolman argued, they had acquired a more abstract mental representation of the maze's spatial layout (Tolman & Honzik, 1930; Tolman and others, 1946).

4.9.2: Learning Without Reinforcement

In yet another study that attacked the very foundations of behaviorism, Tolman (1948) allowed his rats to wander freely about a maze for several hours. During this time, the rats received no rewards at all—they simply explored the maze. Yet, despite the lack of reinforcement, which behaviorists supposed to be essential for maze learning, the rats later learned to run the maze for a food reward more quickly than did other rats that had never seen the maze. Obviously, they had learned the maze during the exploratory period, even though no hint of learning could be seen in their behavior at the time. Tolman called this *latent learning.*

4.9.3: The Significance of Tolman's Work

As with Köhler's experiments, what made Tolman's work both significant and provocative was its challenge to the prevailing views of Pavlov, Watson, and other behaviorists. While Tolman accepted the idea that psychologists must study observable behavior, he showed that simple associations between stimuli and responses could not explain the behavior observed in his experiments. Tolman's *cognitive*

explanations, therefore, presented a provocative challenge to behaviorism (Gleitman, 1991).

Subsequent experiments on cognitive maps in rats, chimpanzees, and humans have broadly supported Tolman's work (Olton, 1992). More recently, brain imaging has pointed to the hippocampus as a structure involved in "drawing" the cognitive map in the brain (Jacobs & Schenk, 2003). So it seems clear that Tolman was on target: Organisms learn the spatial layout of their environments by exploration and do so even if they are not reinforced for exploring. From an evolutionary perspective, the ability to make cognitive maps would be highly adaptive in animals that must forage for food (Kamil and others, 1987). Perhaps that is why we develop them so quickly.

Clark's nutcracker, the bird pictured here, is an amazing illustration of cognitive maps. Each summer, they hide up to 30,000 pine nuts and seeds in the ground all over the Grand Canyon. The following winter, they find 90% of them, despite the differences in the snow-blanketed winter landscape.

4.10: Observational Learning: Bandura's Challenge to Behaviorism

Objective: Describe Bandura's contributions to our understanding of learning

Another famous psychologist, Albert Bandura, followed in Tolman's footsteps by toppling yet another pillar of behaviorism: the idea that rewards and punishments act only on the individual receiving them. Bandura proposed that rewards and punishments can effectively modify our own behavior if we merely see someone else getting them. (This is why casinos make such a fuss over jackpot winners.) Bandura's work, then, suggests that the consequences of behavior can operate indirectly, through *observation.* In doing so, he provided another cognitive component to the field of behavioral learning. Let's see how he demonstrated this idea.

In 1961, the rapid rise of television prompted Albert Bandura to investigate a hunch: Does observing violent behavior make viewers more likely to become violent? At the time, the prevailing notion was that watching violence actually reduced aggressive tendencies, and that it did so by purging the viewer of the need for aggression. Bandura, however, questioned that thinking, and invited children and adults to his lab at Stanford University for a simple experiment. Adults were put in a room with a variety of toys, including a Bobo doll (an inflated plastic clown, weighted at the bottom). Some of the adults were instructed (before entering the room) to attack the doll aggressively by hitting, kicking, and punching it. Other adults were instructed to play gently and quietly while in the room. The children were exposed to one or the other, and later each child was allowed to play alone in the room. What did they do? You guessed it—they imitated what they'd seen the adult do, either mimicking the aggressive behavior, or mimicking the gentle behavior (Bandura and others, 1963). Subsequent studies have shown similar results: Children will imitate aggressive behaviors they have seen on television or in video games, exhibiting up to seven times more aggressive acts than children in a control condition—even when the models are merely cartoon characters (Anderson and others, 2007; Boyatzis and others, 1995).

This boy imitates the aggressive behavior that he has seen from an adult.

4.10.1: Learning by Observation and Imitation

Thus, learning can occur not only by direct experience but also by watching the behavior of another person or *model.* If the model's actions appear successful—that is, if the model seems to find it reinforcing—we may behave in the same way. In this way, learning by observation and imitation is an extension of operant conditioning: We observe someone else getting rewards, but it impacts our behavior as if we had also received a reward.

Psychologists call this *social learning* or **observational learning**. It accounts for children learning aggressive behavior by imitating aggressive role models who are perceived as successful or admirable or who seem to be enjoying themselves. Observational learning explains a plethora of other behaviors as well: how we learn athletic skills, how to drive a car, how to behave with friends, and then shift roles in a job interview. It also influences the fashions we follow, and the rapid spread of slang expressions. We imitate others whom we admire, hoping to receive the same "rewards" we think they are receiving—whether it be status, acceptance, admiration, or something else.

Observational learning occurs in nonhuman species, too, as when a mother cat teaches her kittens how to hunt. In fact, many of the important decisions animals must make to survive—such as what foods to eat, what predators to avoid, and how to find water—rely on observational learning. This type of learning allows young animals to develop effective behaviors without a potentially fatal trial-and-error period. Chimpanzees and crows both learn to use leaves and sticks to make tools that are handy in digging for grubs and ants. Much animal behavior, in fact—both human and nonhuman—occurs as a result of observational learning.

One clever set of studies demonstrated observational learning with rhesus monkeys. In the wild, rhesus monkeys respond to snakes with alarm and avoidance Rhesus monkeys born and raised in labs, though, show no fear of snakes; that is, until researchers showed them a video of a wild rhesus monkey visibly afraid of a snake. After seeing the video, the lab-raised primates avoided snakes for months (Galef & Laland, 2005). Interestingly, a follow-up study showed the lab monkeys a video of a wild rhesus monkey appearing to fear a flower instead of a snake, but in that study the lab monkey did not imitate the flower-fearing behavior—demonstrating, once again, our genetic predisposal to developing quick responses to natural biological threats and predators. Observational learning, then, has adaptive benefit in other words, it helps us survive.

4.10.2: Effects of Media Violence

As you might have guessed, much of the research on observational learning has focused on the impact of violence in film and video (Huesmann and others, 2003). Predictably, the issue is a controversial one, because much of the evidence is **correlational** (Anderson & Bushman, 2001). That evidence makes a credible case, based on more than 50 studies showing that observing violence is associated with violent behavior. But does observing violence *cause* violent behavior? Or is it the other way around: Could it be that violent people are drawn to violent films and videos?

Thanks to more than 100 *experimental* studies, experts now know that observing violence truly does increase the likelihood of violent behavior (Huesmann & Moise, 1996; Primavera & Herron, 1996). In fact, the link between viewing violent media and subsequent behavior aggression is stronger than the link between lead-based paint and children's IQ, and is nearly as strong as the link between cigarette smoking and cancer (Bushman & Anderson, 2001). Viewers of media violence also show less emotional arousal and distress when they subsequently observe violent acts—a habituation-like condition known as *psychic numbing* (Murray & Kippax, 1979). Psychologist Elliot Aronson argues that extensive media violence is one factor contributing to violent tragedies, such as recent spate of school and other shootings in public places (Aronson, 2000).

The effect extends to violent video games as well. One study randomly assigned college students to 15 minutes of either Mortal Kombat or a nonviolent video game, and then measured aggressive behavior afterwards based on whether the video-gaming student would give hot sauce to a fellow student who didn't like spicy foods (but who would have to swallow it anyway). Sure enough, the students who had played Mortal Kombat were much more likely than the control group to dole out the spicy sauce—and what's more, they made them swallow larger amounts of it (Barlett and others, 2009). A companion study found that the more realistic the violence in a video game, the greater the increase in aggressive feelings and arousal (Barlett & Rodeheffer, 2009). Not all imitation is harmful, of course. Thanks to imitation, we also learn about charitable behavior, comforting others in distress, and driving on the legal side of the road. In general, people learn much—both prosocial (helping) and antisocial (hurting) behaviors—through observation of others. This capacity to learn from watching enables us to acquire behaviors efficiently, without going through tedious trial and

error. So while observational learning is a factor in violent behavior, it also enables us to learn socially useful behaviors by profiting from the mistakes and successes of others.

4.10.3: Observational Learning Applied to Social Problems Around the Globe

Television is one of the most powerful sources of observational learning—and not only of the undesirable sort we have just noted. Here at home, the long-running children's program Sesame Street uses such well-loved characters as Big Bird and Cookie Monster to teach language, arithmetic, and courtesy through observational learning. And in Mexico, TV executive Miguel Sabido has deliberately drawn on Bandura's work in creating the popular soap opera *Ven Conmigo* (*Come With Me*), which focuses on a group of people who connect through a literacy class. After the initial season, enrollment in adult literacy classes in the broadcast area shot up to nine times the level in the previous year (Smith, 2002b).

The idea was taken up by a nonprofit group, Populations Communications International, which has promoted it worldwide. As a result, television dramas now aim not only at literacy but at promoting women's rights, safe sex, and preventing HIV and unwanted pregnancies. Such programs are wildly popular, reaching large numbers of devoted fans in dozens of countries and regions around the world, including Latin American, Africa, South and East Asia, the Middle East, the Caribbean, and the Philippines (see Figure 4.11). In China, observers learn about the value of girls; in Tanzania, they learn that AIDS is transmitted by people, not by mosquitoes; and in India, the programs question the practice of child marriages. In the Caribbean, soap operas now promote responsible environmental practices.

And it works. Because of a soap opera broadcast in India, a whole village signed a letter promising to stop the practice of child marriages. Similarly, Tanzanians now increasingly approve of family planning. And in rural villages in India, the enrollment of girls in school has risen between 10% and 38%. Other programs have successfully increased childhood immunizations, decreased HIV transmission, improved nutritional awareness, and bolstered smoking cessation. Overall, it appears that television can be a means of producing positive social change and act as a conduit for psychological research to make a significant difference in people's lives (Naugle & Hornik, 2014; Singhal & Rogers, 2002).

Figure 4.11 Observational Learning Helps With Real-World Problems

Billboards, television programs, and other media campaigns can be effective tools for promoting social change. This billboard in Tanzania, East Africa, along with a popular radio drama that included an AIDS awareness storyline, resulted in increased use of safe sex practices and family planning.

OBSERVATIONAL LEARNING GOES BEYOND TELEVISION But it isn't just television that can promote social change and influence our behavior. Discussing topics and actions with others can also spur us into political or social action, whether it be traditional or radical.

One study examined how this works by first giving participants some reading material about egg-laying chickens being raised in tiny cages (an issue animal-rights activists have long protested), and then telling them that despite the animal welfare concerns, many people still buy eggs from farms raising chickens in this manner. Next, participants read either a paragraph promoting legal political action to stop this practice, or a paragraph promoting illegal, more radical action such as breaking into farms and freeing the chickens. Finally, the participants completed questionnaires asking them how concerned they were about the issue, how important they felt it was to make others aware of the problem, and how likely they were to engage in either political or radical action for this cause. Before completing the questionnaires, though, half the participants had an opportunity to engage in some discussion about the issues with a small group of others. Did the discussions make a difference?

Indeed they did. Researchers found that those in the discussion groups expressed greater concern for the chickens and greater interest in making others aware of the issue than did participants who didn't discuss the topic before completing their questionnaires. This effect applied to both legal political action and to illegal radical actions—in other words, people were likely to go along with and commit to whatever type of action the group

was discussing, whether it was legal or not. The results, investigators assert, support the idea that radicalism is not a result of a personality type, but driven more by exposure to like-minded others (Thomas and others, 2014). This study and others like it add to the body of scientific evidence demonstrating the importance of social learning in human behaviors.

4.11: Brain Mechanisms, Learning, and "Higher" Cognitive Learning

Objective: **Examine the brain processes involved in learning**

It now seems clear that much of the complex and abstract learning required in college classes is fundamentally different from the learning that Pavlov, Watson, and Skinner studied. Acquiring knowledge about the field of psychology, for example, involves building mental images, assimilating concepts, and pondering ways they can be related. It's not that behavioral conditioning isn't involved in human learning—after all, students do work for grades and salivate when they see a pizza—but principles of behavioral learning don't tell the whole story of "higher" cognitive learning.

The following chapters will take us deeper into this realm of cognitive learning, where we will discuss memory, thinking, concept formation, problem solving, and intelligence. There, you will learn more about mental structures that underlie cognition. The challenge we will face is exactly the one behaviorists were hoping to avoid: In studying cognition, we must make inferences about processes we cannot measure directly. We will find, however, that cognitive psychologists have developed very clever methods for obtaining objective data on which to base their inferences. The newest of these—coming fully online in the past decade or so—is brain imaging, which, as we will see, has brought psychologists very close to an objective glimpse at private mental processes.

What do we know so far about the biology of learning? On the level of neurons, learning involves physical changes that strengthen the synapses in groups of nerve cells—a process called **long-term potentiation** (Antonova and others, 2001; Kandel, 2000). Initially, neurons in various brain areas involved in a learning task work very hard—for example, as a person learns the location of various objects, cells in the **visual cortex** and **parietal cortex** may fire rapidly. As learning progresses, the firing

pattern becomes less intense as the strength of the neural connections becomes better established (Buchel and others, 1999). The more a neural pathway is utilized, the stronger and denser it gets. Just as the muscles we exercise grow bigger, so do the neural pathways we exercise—thus, in a way, learning does for your brain what strength training does for your body (Buchel and others, 1999).

We also know that the **cerebellum** and the **limbic system** are crucially involved in classically conditioned responses, such as learned fears and conditioned taste aversions (Miller, 2004; Taub & Mintz, 2010). In operant conditioning, the brain's reward circuitry comes into play, especially in parts of the **frontal cortex** and the limbic system, rich in **dopamine** receptors (O'Doherty and others, 2004; Roesch & Olson, 2004). Many experts now believe the brain uses this circuitry to identify the rewards that are the essence of positive reinforcement (Fiorillo and others, 2003; Kim and others, 2012; Shizgal & Arvanitogiannis, 2003).

4.11.1: The Brain on Extinction

While it is important for our survival to remember learned associations and consequences of our behavior, it's also important to *forget* associations that turn out to be irrelevant. Just as wild animals need to forget about a water hole that has run dry, you must learn to deal with changes in school schedules or traffic laws. These examples involve *extinction* of responses learned previously. Neuroscientists have found that extinction occurs when certain **neurotransmitters**, including glutamate and norepinephrine, block memories (Miller, 2004; Travis, 2004).

Discoveries such as these have stimulated the search for drugs that could accomplish something previously only seen in futuristic movies: blocking the emotional trauma associated with certain events, such as combat experiences, violent crimes, and horrific accidents. And recent research boasts early success (Kindt and others, 2009; Soeter & Kindt, 2010). In both animals and humans, experimenters have successfully eliminated the emotional arousal associated with typical memories of such traumatic events. And while this remarkable discovery holds great potential for survivors of violent crime, war, accidents, and natural disasters, ethical questions remain about future directions in this rapidly advancing field.

4.11.2: "Fear of Flying" Revisited

But before moving on, let's return to the problem with which we began the chapter: Sabra's fear of flying.

Psychology Matters

Fear of Flying Revisited

Through cognitive-behavioral therapy, Sabra learned new ways of thinking about the experience of flying. Gradual exposure to flying, called *desensitization* (a form of extinction), also helped to banish her fearful responses.

Which kind of learning—operant conditioning or classical conditioning—do you suppose lay behind Sabra's aversion to flying?

Although we may never know exactly what caused her fear in the first place, we can guess that both forms of conditioning were involved. Fears commonly arise through direct experience involving classical conditioning. Alternatively, fears can be learned through observational learning, perhaps from a fearful parent or peer. And once the fear has been learned, operant conditioning can maintain it, because people are rewarded by avoiding the feared object.

These assumptions have led some airlines to experiment with a hybrid treatment known as *cognitive–behavioral therapy*, aimed at helping people overcome their fear of flying. Happily, Sabra located one of these programs a few weeks before the conference started. She contacted the airline and signed up for three weekend sessions to be held at a nearby airport.

She arrived at the appointed time, full of expectations and apprehensions.

- *Would the therapist probe her childhood experiences and fantasies?*
- *Would she have to take tranquilizers?*
- *Or would she have to undergo some sort of terrifying treatment, such as flying upside down in a small airplane?*

Her worst expectations turned out to be unfounded. The treatment sessions were organized by a behavioral psychologist who gathered the nine participants in a small conference room. He began by explaining that such fears are learned—much as you might learn to cringe when you see a needle at the doctor's office. But because it is not important how such fears originated, this fear-of-flying program would focus on the present, not the past, he said. Sabra began to feel more relaxed.

The conditioning-based therapy program combined several learning strategies. A classical conditioning component would involve extinction of her fear through gradual exposure to the experience of flying. Operant conditioning would play a role through positive reinforcement from the therapist and other members of the group. In addition, a cognitive component would involve learning more about how airplanes work.

After a brief overview of the process they would experience over the next 3 weeks, the group took a tour of the airport, including the cabin of a passenger jet parked on the tarmac. Then they went back to the conference room to learn about how a pilot controls an airplane and about the physical forces that keep it in the air. The group also watched some videos involving routine flights in a commercial jet. All in all, this first session went smoothly, and everyone seemed much more at ease than when they started.

The second weekend began with more classroom discussion. Then, the class went back into the airliner, where they took seats and went through a series of relaxation exercises designed to extinguish the participants' fears and to learn a new and more relaxed response to the experience of being in an airplane. This training included deep breathing and progressive relaxation of specific muscle groups all over the body. When everyone in the group reported feeling relaxed, they again watched videos of flight on the plane's TV monitors. This was followed by more relaxation exercises. The final activity for the second weekend involved starting the engines and going through the preflight routine—all the way up to takeoff . . . and more relaxation exercises.

The final weekend session was almost identical to the previous one. The only difference was that "graduation" involved an actual flight—a 20-minute trip out over the local countryside and back to the airport. It was, of course, voluntary, but only one of the nine people in the class chose not to go. Sabra went, but not without some anxiety. The therapist, however, encouraged the group to focus on the relaxation exercises they had learned rather than on their feelings of fear. To the amazement of all who participated, these learning-based techniques helped them through the flight exercise without losing control of their emotional responses. Although no one's fear had vanished completely, everyone on board was able to bring it under control.

The happiest result was that Sabra was able to go to her meeting in Hawaii—where, by the way, she had a productive conference and a wonderful time. For our purposes we should also note that she has flown several times since then. Each trip gets a little easier, she says—just as the psychology of learning would predict.

Critical Thinking Applied: Do Different People Have Different "Learning Styles"?

Without a doubt, people differ in the ways they approach learning. As you can see by observing your classmates, everyone brings a different set of interests, abilities, temperamental factors, developmental levels, social experiences, and emotions to bear on learning tasks. But can we say these differences constitute distinct "learning styles"? For example, are some people "visual learners" who need to *see* the material rather than hearing it, as, perhaps, an "auditory learner" must do?

Educators have been drawn to the concept of learning styles in the hope of encouraging learning by tailoring instruction to fit students' needs. The excitement about learning styles has, in turn, led to a proliferation of learning-style inventories, each aiming to diagnose how a student learns best, with implications for how to tailor a teaching environment to fit each learner. Perhaps you have taken one such test. But is all this buzz based on fact or fantasy?

What Are the Critical Issues?

From a critical perspective, the principal issue centers on the meaning of "learning styles." The term may seem intuitively clear—but does it mean the same thing to everyone? And are learning styles really *requirements* or mere *preferences* for learning? In other words, if you are a "visual learner," to what extent does this truly impact your ability to learn when visuals are not available? And are learning styles unchangeable (like eye color), or can people adjust their approach to learning to fit the demands of the subject matter (say, literature, psychology, dentistry, or music)?

What Is the Source?

Unfortunately, most of the publications on learning styles come from sources that have not performed the controlled studies needed to support their claims (Rohrer & Pashler, 2012; Stahl, 1999). Rather, the "research" they say supports their claims is largely unpublished and thus unavailable to us for critical evaluation or for scrutiny by experts in teaching and learning. Publishing and critiquing studies and their results is a key step in the *scientific method*. Avoiding this requirement may be a warning sign that the claimant has fallen prey to one or more types of bias and thus lacks credibility.

What Is the Evidence?

One problem we encounter in examining the evidence for learning styles is that, even among learning-style enthusiasts, we find no agreed-upon list of distinct learning styles. Although educators commonly talk about "verbal learners," "visual learners," and "kinesthetic (movement) learners," some inventories also claim to assess some combination of the following styles: tactile (touch), logical, social, solitary, active/reflective, sensing/intuitive, thinking/feeling, judging/perceiving, sequential/global. This widespread disagreement regarding even the basic categories of "learning styles" should be a clue to the critical thinker that claims may be based on mere speculation and common sense rather than true scientific findings.

A second—and more troublesome—red flag we see when we examine the evidence is the scarcity of findings to support any relationship between a person's learning style and his or her actual learning. In fact, most advocates of learning styles have little supporting data for their claim that people with different scores learn the same material in different ways. In fact, the research we have shows that matching a teaching environment to a person's purported learning style has little to no effect on his or her achievement. Thus, a more accurate interpretation of learning styles may be that they reflect preferences in learning rather than requirements for learning (Krätzig & Arbuthnott, 2006).

Does the Issue Require Multiple Perspectives?

If learning styles do exist, could a cross-cultural perspective help us understand them (Winerman, 2006b)? Studies by Nisbett (2003) and others have shown that Asians and Americans often perceive the world quite differently, with Americans focusing on central objects and Asians taking in a scene more globally. (The difference is cultural, not physiological: Americans of Asian ancestry perceive in essentially the same way as do other Americans.) To illustrate the difference in these two styles of "seeing," look at the image of the tiger against a jungle background on this

Look at the image of the tiger. What parts of the picture do you look at? Where do your eyes travel when viewing the image? Nisbett's team identified that Americans spend more time looking at the tiger and other prominent objectives (such as the tree, and immediate surroundings of the tiger) whereas Asians spend more time scanning details of the context and background.

page. Nisbett's group found that the typical American spends more mental energy on putting prominent elements of the scene—the tiger—into logical categories, while Asians usually pay more attention to the context and background—the jungle.

Culture can also influence the way people approach classroom learning. For example, Americans generally believe that academic success is the result of innate intelligence, while East Asians emphasize discipline and hard work (Li, 2005). Which belief system would you guess might encourage most children to do well in school?

Other cultural differences can play a role in academic achievement as well, says Korean-born psychologist Heejung Kim. After struggling with classes that required group discussion, which was rare in her Korean educational experience, Kim (2002) decided to look for differences between the ways Asians and Americans approach academic tasks. As she predicted, when Asian and American college students were given problems to solve, the Americans usually benefited from talking over the problems with each other, while such discussion often inhibited problem solving by Asian students.

We note, however, that these cultural differences are not part of the current debate regarding "learning styles" and thus have not been included in any of the learning styles inventories marketed by a variety of organizations. We mention them here, however, to show that ideas currently based on popular opinion (such as the impact of learning styles on performance) stand to gain credibility by accepting criticism from the scientific community and using it to seek improvements in their theories. In this case, advocates of learning styles might do well to conduct controlled tests to investigate whether some of these cultural differences might result in actual performance differences and, if so, create categories of learning styles that truly reflect **empirical** differences.

What Conclusions Can We Draw?

In general, while we had best be cautious about most claims regarding learning styles, we should remain open to new developments, including those that may emerge from cross-cultural research. Beyond that, we should acknowledge that interest in learning styles has encouraged teachers and professors to present material in a variety of ways in their classes—including media, demonstrations, and various "active learning" techniques. Further, available research suggests everyone learns better when the same material can be approached in more than one way—both visual and verbal, as well as through hands-on learning (McKeachie, 1990, 1997, 1999).

But back to our main point: We recommend caution when interpreting results of tests that purport to identify your learning style. Beware of people who tell you that you are a visual learner, a reflective learner, or some other type:

Just because you prefer images to words, for example, does not mean that you should avoid reading and just look at the pictures. This sort of thinking erroneously suggests that each person learns in only one way. You could experiment with additional study strategies, though, such as creating concept maps if visual images help you learn, or recording lectures if it helps you to listen to them repeatedly—but you still need to read the assigned material.

The other problem with the learning styles myth is that it erroneously suggests that the way we learn is fixed and unchanging. Instead, we need to learn how to adapt the way we learn to the type of material to be learned: You wouldn't learn about music in exactly the same way you would learn about math. Learning involves an interaction of many factors: the learner, the material, the medium in which the material is presented, the organization of the presentation, the personalities of the teacher and learner, and the environment in which learning takes place, to name a few. And your learning thus far in psychology has showed you how adaptable our brains are, literally wiring themselves to accommodate new experiences. So we encourage you to try learning in as many ways as you can—after all, that's one of the great opportunities of a college experience.

Do It Yourself!
Adapting Yourself to Better Learning

Most students would like to improve their performance in one or more classes. Rather than wasting time with the **pseudoscience** of learning styles, try applying the bona fide principles of classical and operant conditioning to a plan designed specifically to help you achieve your goal. Using the various principles you have learned so far in this chapter, design your own behavior change program.

First, identify a specific behavior. Instead of setting a broad goal, such as getting a better grade, make your goal specific—reading eight textbook pages per day, or reviewing your class notes each day. Then identify at least five ways you can encourage the new behavior based on the principles of classical and operant conditioning. For starters, you might identify one feeling or biological stimulus you want to associate with the desired behavior and figure out a way to achieve that with classical conditioning. Then, you'll definitely want to identify one or two reinforcers you can use—continuously at first. Next, decide what schedules of reinforcement you will implement once you have begun to shape the behavior successfully, and—based on that—write down how often you will receive a reinforcer and what it will be. For best results, use a variety of reinforcers on a variety of schedules to keep yourself responding well. Then get started! Keep track of your progress, and make adjustments as needed.

Summary: Learning and Human Nurture

Chapter Problem

Assuming Sabra's fear of flying was a response she had learned, could it also be treated by learning? If so, how?

- **Classical conditioning** played one role in Sabra overcoming her fear of flying. By creating positive associations with the experience of flying, Sabra underwent a combination of extinction and counterconditioning.
- **Operant conditioning** helped Sabra overcome her fear of flying through shaping—providing positive reinforcement for each successive step toward flying in an airplane. The effectiveness of the treatment provided negative reinforcement by removing the anxiety and fear she had previously associated with flying.
- **Cognitive learning** added instruction about some of the aeronautical aspects of flying, thus helping Sabra develop a mental understanding of how airplanes work, as well as observational learning during which Sabra observed calm passengers taking a flight.

What Sort of Learning Does Classical Conditioning Explain?

> **Core Concept 4.1**
>
> **Classical conditioning explains associative learning, in which a stimulus that produces an innate reflex becomes associated with a previously neutral stimulus, which then acquires the power to elicit essentially the same response.**

Learning produces lasting changes in behavior or mental processes, giving us an advantage over organisms that rely more heavily on **reflexes** and **instincts**. Some forms of learning, such as **habituation**, are quite simple, while others, such as classical conditioning, operant conditioning, and cognitive learning, are more complex.

The earliest learning research focused on **classical conditioning**, beginning with Ivan Pavlov's discovery that **conditioned stimuli** (after being paired with **unconditioned stimuli**) could elicit reflexive responses. His experiments on dogs showed how **conditioned responses** could be **acquired** and extinguished and undergo **spontaneous recovery** in laboratory animals. He also demonstrated **stimulus generalization** and discrimination learning. John Watson extended Pavlov's work to people, notably in his famous experiment on the conditioning of fear in Little Albert. More recent work, particularly studies of taste aversions, suggests, however, that classical conditioning is not a simple stimulus–response learning process but also has a biological component. Classical conditioning has applications in advertising, wildlife management, and a variety of human emotional responses to various experiences. In general, classical conditioning builds on basic, survival-oriented responses and extends them to new stimuli. Therapeutic applications of Pavlovian learning include the prevention of harmful food aversions in chemotherapy patients.

How Do We Learn New Behaviors by Operant Conditioning?

> **Core Concept 4.2**
>
> **In operant conditioning, the consequences of behavior, such as rewards and punishments, influence the probability that the behavior will occur again.**

A more active form of learning was first explored by Edward Thorndike, who established the **law of effect** based on his study of trial-and-error learning. B. F. Skinner expanded Thorndike's work, now called **operant conditioning**, to explain how responses are influenced by their environmental consequences. His work identified and assessed various consequences, including **positive reinforcement** and **negative reinforcement**, **punishment**, and an operant form of **extinction**. The power of operant conditioning lies in its ability to create new, voluntary behaviors. To learn how this works, Skinner and others examined **continuous reinforcement** as well as several kinds of **intermittent reinforcement** contingencies, including **Fixed Ratio (FR)**, **Variable Ratio (VR)**, **Fixed Interval (FI)**, and **Variable Interval (VI)** schedules. As for punishment, research has shown it is more difficult to use than reinforcement because it has several undesirable side effects. There are, however, alternatives, including operant extinction and rewarding of alternative responses, application of the **Premack principle**, and prompting and shaping new behaviors. These techniques have found practical use in controlling behavior in schools and other institutions, as well as in behavioral therapy for controlling fears and phobias.

How Does Cognitive Psychology Explain Learning?

> **Core Concept 4.3**
>
> **According to cognitive psychology, some forms of learning must be explained as changes in mental processes rather than as changes in behavior alone.**

Much research now suggests that learning is not just a process that links stimuli and responses: Learning is also cognitive. This was shown in Köhler's work on insight learning in chimpanzees, in Tolman's studies of cognitive maps in rats, and in Bandura's research on observational

learning and imitation in humans—particularly the effect of observing aggressive models, which spawned many studies on media violence and, recently, applications dealing with social problems, such as the spread of AIDS. All this cognitive research demonstrates that learning does not necessarily involve changes in behavior, nor does it require reinforcement. In the past three decades, cognitive scientists have reinterpreted behavioral learning, especially operant and classical conditioning, in cognitive terms, as well as searched for the neural basis of learning.

Critical Thinking Applied: Do Different People Have Different "Learning Styles"?

Media attention on so-called learning styles continues to encourage learners to focus on learning in ways that match their learning style. Empirical evidence to support this notion, however, is sparse. Nor is there general agreement on a specific set of learning styles. A critical thinking approach suggests that people have learning *preferences*, but they can learn to adapt their approach to different kinds of material.

Additional Video Resources

Here are two video resources we think you will find both interesting and of personal value to understanding learning and human *nurture*.

WATCH   Classical Conditioning in Action.

Watch as this college student tries classical conditioning on his roommate at: https://www.youtube.com/watch?v=Eo7jcI8fAuI. Can you identify the US, UR, NS, and CS in this example?

WATCH   Observational Learning in Chimpanzees

Watch these chimpanzees at the Jane Goodall Institute learning how to use tools and forage for food by watching others at: https://www.youtube.com/watch?v=qyy2ko191s0.

Chapter 5
Memory

Like a footprint in the sand, memories are rarely indelible.

Core Concepts

5.1 Human memory is an information processing system that works constructively to encode, store, and retrieve information.

5.2 Each of the three memory stages encodes and stores memories in a different way, but they work together to transform sensory experience into a lasting record that has a pattern or meaning.

5.3 Whether memories are implicit or explicit, successful retrieval depends on how they were encoded and how they are cued.

5.4 Most of our memory problems arise from memory's "seven sins"—which are really by-products of otherwise adaptive features of human memory.

Does memory make an accurate and indelible record of our past? Or is it like a footprint in the sand, shifting with time and circumstance? In fact, the truth about memory encompasses both of those extremes. Memory can be highly malleable—yet many of our memories are quite accurate. The challenge lies in knowing when to rely on memory and when to question it, as the following cases will illustrate.

Case 1

Twelve-year-old Donna began to suffer severe migraine headaches that left her sleepless and depressed. Concerned, her parents, Judee and Dan, sought help for her. Over the next year, Donna was passed from one therapist to another, ending up with a psychiatric social worker who specialized in treatment of child abuse. It was to that therapist that Donna disclosed—for the first time—having been sexually molested at the age of 3 by a neighbor. The therapist theorized that memories of the assault, buried in her mind for so long, were probably responsible for some of Donna's current problems, so she continued to probe for details and other possible instances of sexual abuse.

Eventually, the therapist asked her to bring in a family photo album, which included a photo of Donna, taken at age 2 or 3, wearing only underpants. The therapist suggested this might be evidence that Donna's father had a sexual interest in her and, possibly, had molested her. Moreover, the therapist contacted the authorities, who began an investigation (ABC News, 1995).

For two years, Donna felt intense pressure to blame her father, but consistently denied he had molested her. Finally, amid increasing confusion about her childhood memories, she began to believe she suffered from "repressed memory syndrome" and that her father had abused her repeatedly during her childhood. Eventually, Donna was hospitalized. While in the hospital, she was placed on medication, hypnotized repeatedly, and diagnosed with multiple personality disorder (now called **dissociative identity disorder**).

As for her father, Dan was arrested and tried on charges of abuse based solely on his daughter's recovered memory. When his 2-week trial ended in a hung jury, Dan went free. Shortly after the trial, Donna moved to another state with a foster family. In new surroundings and far away from the system that had supported her story, she began to believe her memories were false. Eventually, her doctor recommended she be sent back to her family, where they began the slow process of rebuilding broken relationships and trust.

Case 2

Ross is a college professor who entered therapy because he was unhappy with his life. Describing his condition, he said, "I felt somehow adrift, as if some anchor in my life had been raised. I had doubts about my marriage, my job, everything" (Schacter, 1996, p. 249). Then, some months after entering therapy, he had a dream that left him with a strong sense of unease about a certain camp counselor he had known as a youth. Over the next few hours, that sense of unease gradually became a vivid recollection of the counselor molesting him.

From that point on, Ross became obsessed with the memory, finally hiring a private detective, who helped him track down the counselor in a small Oregon town. After numerous attempts to talk with the counselor by telephone, Ross at last made contact and taped the phone conversation. The counselor admitted molesting Ross, as well as several other boys at the camp. Strangely, Ross claimed he had simply not thought about the abuse for years—until he entered therapy.

> **CHAPTER PROBLEM:** How can our knowledge about memory help us evaluate claims of recovered memories?

Keep in mind there is no sure way to "prove a negative." That is, without some independent evidence, no one could ever prove conclusively that abuse or some other apparently long-forgotten event did *not* occur. Instead, we must weigh claims against our understanding of memory and how it works. This applies to disturbing circumstances, such as the stories above that involved the possibility of sexual abuse, as well as more everyday examples, such as when you and a friend or family member have different recollections of a particular event or conversation. In particular, we need answers to the following questions:

- Does memory make an accurate record of everything we experience?
- Are traumatic experiences, such as those of sexual abuse, likely to be *repressed* (blocked from consciousness), as Sigmund Freud taught? Or are we more likely to *remember* our most emotional experiences, both good and bad?
- How reliable are memories of our early childhood experiences?
- How easily can memories be changed by suggestion, as when a therapist or police officer might suggest that sexual abuse occurred?
- Are vivid memories more accurate than ordinary, less-distinct memories?
- Does the confidence we have in a memory equate with its accuracy?

You will find answers to these questions, and many more, in this chapter. Let's begin with the most fundamental question of all.

Key Question: What Is Memory?

> ### Core Concept 5.1
> **Human memory is an information processing system that works constructively to encode, store, and retrieve information.**

Undoubtedly, memory does play tricks on us. Our best defense against those tricks is an understanding of how

memory works. So let's begin building that understanding with a definition: Cognitive psychologists view **memory** as a system that encodes, stores, and retrieves information—a definition, by the way, that applies equally to a living organism or a computer. Unlike a computer's memory, however, we humans have a *cognitive* memory system that is selective—and sometimes biased—in taking information from the senses and converting it into meaningful patterns that we store and access later as needed. These memory patterns, then, form the raw material for thought and behavior, which in turn enables you to recognize a friend's face, ride a bicycle, recollect a trip to Disneyland, and (if all goes well) recall the concepts you need during a test. More generally, the core concept for this section characterizes memory this way:

> Human memory is an information processing system that works constructively to encode, store, and retrieve information.

We want to start by calling your attention to the word "constructively" in our core concept. While we often use that term to imply that something is beneficial (such as in the phrase constructive criticism), our reference to memory as constructive has a different meaning. In this sense, we use *constructive* to refer to the actual construction of our memory system. That is, we don't take in and store information in our memory in a static, predictable way. As you will see as we learn the basics of memory, our unique and personal interpretations of information and events color the way we encode and remember them—which explains how different people exposed to the same situation often remember it in different ways. Let's examine this notion in a bit more detail by looking at the metaphors people commonly (yet mistakenly) use to describe memory.

By the end of this section, you will be able to:

5.1   **Recognize that memories represent our unique perceptions of events rather than being accurate or objective**

5.1: Memory Is Constructed, and Reconstructed

Objective: **Recognize that memories represent our unique perceptions of events rather than being accurate or objective**

We often use metaphors to help us understand complicated ideas. One such metaphor compares human memory to a library or a storehouse, emphasizing the ability of memory to hold large amounts of information (Haberlandt, 1999). Another compares memory to a

computer. Some metaphors for memory, however, are misleading. That's certainly the case with the "video recorder" metaphor for memory, which implies that human memory makes a complete and accurate record of everything we experience.

Experiments clearly show this video-recorder metaphor is wrong. And, especially in some cases of "recovered memories," believing in the unfailing accuracy of memory can be dangerously wrong. Instead, human memory is an *interpretive* system that takes in information and, much like an artist, discards certain details and organizes the rest into meaningful patterns. As a result, our memories represent our unique **perceptions** of events rather than being accurate or objective representations of the events themselves.

Simply put, then, we don't technically retrieve memories—in truth, we *reconstruct* them. We start with fragments of memory—like pieces of a jigsaw puzzle. Then, from these fragments, we reconstruct the incident (or idea, emotion, or image) by filling in the blanks *as we remember it*, rather than the way it actually was. Most of the time this works well enough that you don't realize just how much of your memory is actually guesswork!

A look at Figure 5.1 (p. 156) should convince you of this reconstructive process.

Some memories are sketchier than others. In general, psychologists have found we make the most complete and accurate memory records for:

- Information on which we have *focused our attention,* such as a friend's words against a background of other conversations

- Information in which we are *interested,* such as the plot of a favorite movie

- Information that *arouses us emotionally,* such as an especially enjoyable or painful experience (unless the material also brings our biases into play, as when we are in a heated discussion with a loved one)

- Information that *connects with previous experience,* such as a news item about the musician whose concert you attended last week

- Information that we *rehearse,* such as material reviewed before an exam

The rest of the chapter will unfold this cognitive approach to memory, known as the **information-processing model**. It emphasizes the systematic changes information undergoes on its way to becoming a permanent memory— quite different from the naïve video recorder model. The information-processing model also emphasizes that memory is *functional*—that is, it performs useful functions for us. The most basic of these, we will see, are the encoding, storage, and retrieval of information.

Figure 5.1 The Penny Test

Which image is the most accurate portrayal of a penny?
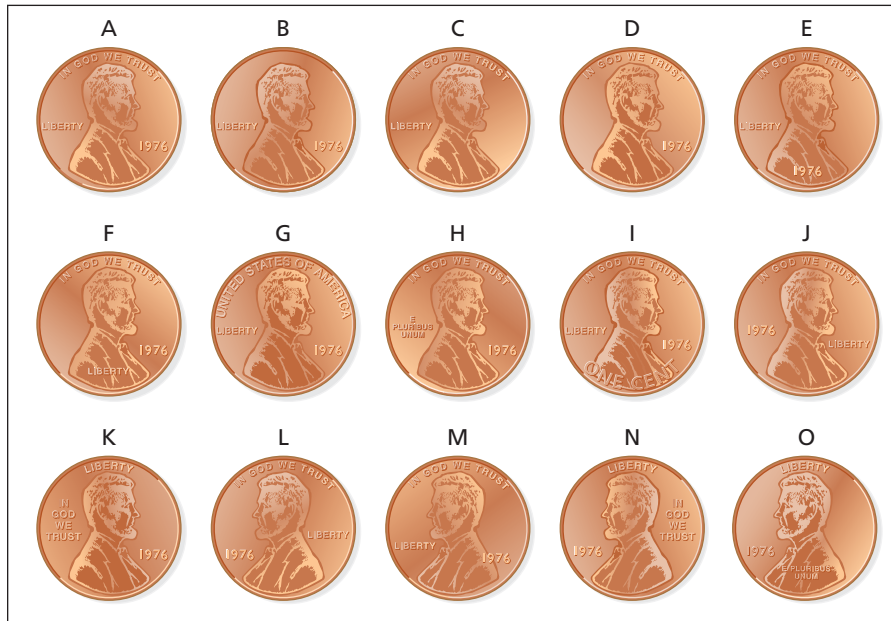
Consider This

Unless you are a coin collector, you probably pay little attention to the details of these familiar objects. So, when retrieving the image of a penny, you automatically fill in the gaps and missing details—without realizing how much of the memory image you are actually creating. The correct answer is A.

5.1.1: Memory's Three Basic Tasks

In simplest terms, human memory takes essentially meaningless sensory information (such as the sounds of your professor's voice) and changes it into meaningful patterns (words, sentences, and concepts) you can store and use later. To do so, memory must first encode the incoming sensory information in a useful format.

1. **Encoding** first requires that you select some stimulus event from the vast array of inputs assaulting your senses and make a preliminary classification of that stimulus. Is it a sound, visual image, odor, taste, or pain? Next you identify the distinctive features of that input. If it's a sound, is it loud, soft, or harsh? Does it fit some pattern, such as a car horn, a melody, a voice? Is it a sound you have heard before? Finally, you mentally tag, or label, an experience to make it meaningful. ("It's Dr. Johnson. He's my psychology professor!")

   Often, encoding is so automatic and rapid that we have no awareness of the process. For example, you can probably recall what you had for breakfast this morning, even though you didn't deliberately try to make the experience "stick" in your mind. Emotionally charged experiences, such as an angry exchange with a co-worker, are even more likely to lodge in memory without any effort to encode them (Dolan, 2002).

On the other hand, memories for concepts, such as the basic principles of psychology, usually require a deliberate encoding effort to establish a usable memory. In a process called *elaboration*, you attempt to connect a new concept with existing information in memory. One way to do this is to link the new material to personal, concrete examples, as when you associate the term **negative reinforcement** with the removal of pain when you take an aspirin. (As an aid to elaboration, this text deliberately provides many such examples that, we hope, will help you connect new concepts with your own experiences.) In fact, failure to elaborate is a common cause of memory errors: If you didn't know the answer to the Penny Test, for example, you probably never paid close attention to the configuration of a penny, and thus never really encoded it to begin with.

2. **Storage**, the second essential memory task, involves the retention of encoded material over time. But it's not a simple process. As we get deeper into the workings of memory, you will learn that memory consists of three parts, or stages, each of which stores memories for different lengths of time and in different forms. The trick of getting difficult-to-remember material into long-term storage, then, is to recode the information the way long-term memory "likes" it before the time clock runs out. For example, while listening to a lecture, you may have just a few seconds to encode a pattern or meaning in the

sound of your professor's voice (for example, recognizing her use of the term "encoding") before new information comes along and the old information is lost.

3. **Retrieval**, the third basic memory task, is the payoff for your earlier efforts in encoding and storage. When you have a properly encoded memory, it can take only a split second for a good cue to access the information, bring it to consciousness, or, in some cases, to influence your behavior at an unconscious level. (Let's test the ability of your conscious retrieval machinery: Can you remember which of the three memory tasks occurs just before *storage?*)

Alas, retrieval isn't always accurate, because the human memory system—marvelous as it is—sometimes makes errors, distorts information, or even fails us completely. The good news is you can combat many of the common ways our memories go awry with a few simple techniques we will discuss throughout this chapter.

Psychology Matters

Would You Want a "Photographic" Memory?

Suppose your memory were so vivid and accurate you could "read" paragraphs of this book from memory during your next exam. Such was the power of a 23-year-old woman tested by Charles Stromeyer and Joseph Psotka (1970). One of the amazing things she could do was to look at the meaningless configuration of dots in the left-hand pattern in Figure 5.2 and combine it mentally with the right-hand image. The result was the combined pattern shown in Figure 5.3. Wouldn't it be great to have such a "photographic" memory? Not entirely, it turns out.

Figure 5.2 A Test of Eidetic Imagery

People with good eidetic imagery can mentally combine these two images to see something that appears in neither one alone.
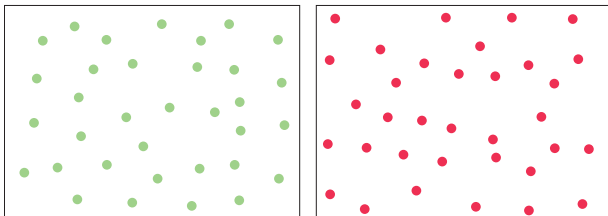
Look at the dot pattern on the left in the figure for a few moments and try to fix it in your memory. With that image in mind, look at the dot pattern on the right. Try to put the two sets of dots together by recalling the first pattern while looking at the second one. If you are the rare individual who can mentally combine the two patterns, you will see something not apparent in either image alone. Difficult?

No problem if you have eidetic imagery—but impossible for the rest of us. If you want to see the combined images, but can't combine them in your memory, look at Figure 5.3.

Figure 5.3

The combined images from Figure 5.2 form a number pattern.
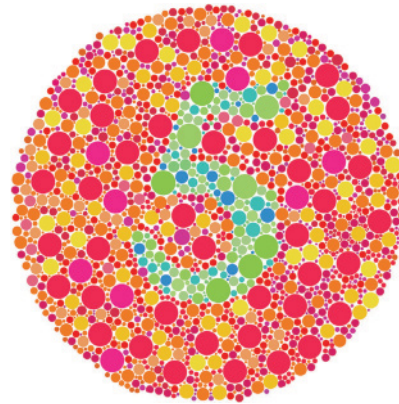
How Does Eidetic Memory Work?

The technical term for "photographic memory" is **eidetic imagery**. Psychologists prefer this term because eidetic images differ in many important respects from images made by a camera (Haber, 1969, 1980; Searleman, 2007). For example, a photographic image renders everything in minute detail, while an eidetic image portrays the most interesting and meaningful parts of the scene most accurately and is subject to the same kind of distortions found in "normal" memories.

Eidetic memories also differ in several respects from typical human memory images. For one thing, *eidetikers* describe their memory images as having the vividness of the original experience (Neisser, 1967). For another, eidetic images are visualized as being "outside the head" rather than inside—in the "mind's eye." (Yet, unlike a person who is hallucinating, eidetikers recognize these images as *mental* images.) Further, an eidetic image can last for several minutes—even for days, in some cases. For example, the woman tested by Stromeyer and Psotka could pass the dot-combining test even when she saw the two patterns 24 hours apart. But, remarkable as this is, the persistence of eidetic images can be a curse. Eidetikers report that their vivid imagery sometimes clutters their minds and interferes with other things they want to think about (Hunter, 1964).

Eidetic imagery appears most commonly in children and only rarely in adults. One estimate suggests that up to 5% of children show some eidetic ability—although in most instances it's not good enough to pass the dot-combining test (Gray & Gummerman, 1975). And, in case you were wondering, there are no gender differences in eidetic memory: Boys and girls alike seem to have similar likelihoods of possessing the ability (Searleman, 2007). While no one knows why eidetic imagery tends to disappear in adults, it may follow some sort of developmental sequence—like losing one's baby teeth. Possibly its disappearance is related to the emphasis placed on logical thought that typically comes with the beginning of formal education and dovetails with a change in children's thinking styles.

Case studies also suggest a connection between the decline of eidetic imagery and the development of language skills: Eidetikers report that eidetic images are strongest when they remain mere images; describing an eidetic image in words makes it fade from memory, and eidetikers learn to exploit this fact to

control their intrusive imagery (Haber, 1969,1970). Research in forensic psychology has found that, for ordinary people (noneide-tikers) as well, giving verbal descriptions of suspects' faces inter-feres with later memories for those faces. Likewise, trying to describe other hard-to-verbalize perceptions, such as a voice or the taste of a wine, impairs most people's abilities to recall those perceptions later (Bower, 2003; Dodson and others, 1997).

A study from Nigeria further supports the idea that loss of eidetic ability may result from conflict between language skills and visual imagery: Eidetic imagery was found to be common not only among Ibo children but also among illiterate adults of the tribe who were living in rural villages. Although many of these adults could correctly draw details of images seen ear-lier, members of the same tribe who had moved to the city and learned to read showed little eidetic ability (Doob, 1964).

Whatever eidetic memory may be, it is clearly rare—so rare, in fact, that some psychologists have questioned its existence (Crowder, 1992). The few existing studies of "photographic mem-ory" have portrayed it as different from everyday memory, as we have seen. Truthfully, however, we know relatively little about the phenomenon, and few psychologists are currently studying it.

Eidetic imagery presents not only a practical problem for those rare individuals who possess it but also a theoretical problem for cognitive psychologists. If eidetic imagery exists, is a known component of memory responsible? On the other hand, if it proves to be a unique form of memory, how does it fit with the widely accepted three-stage model of memory?

Key Question: How Do We Form Memories?

Core Concept 5.2

Each of the three memory stages encodes and stores memories in a different way, but they work together to transform sensory experience into a lasting record that has a pattern or meaning.

If information in a lecture is to become part of your perma-nent memory, it must be processed in three sequential stages: first in sensory memory, then in working memory, and finally in long-term memory. The three stages work like an assembly line to convert a flow of incoming stimuli into meaningful patterns you can store and later recon-struct. This three-stage model, originally developed by Richard Atkinson and Richard Schiffrin (1968), is now widely accepted—with some elaborations and modifica-tions. Figure 5.4 shows how information flows through the three stages. (Caution: Don't get these three *stages* confused with the three basic *tasks* of memory we covered earlier.)

The most fleeting of the three stages, **sensory memory** typically holds sights, sounds, smells, textures, and other sensory impressions for a maximum of a few seconds. Although sensory memory usually operates on an uncon-scious level, you can see its effects in the fading luminous

Figure 5.4 The Three Stages (of Memory)

Memory is generally thought to be divided into three stages of pro-cessing. Everything that eventually goes into long-term storage must first be processed by sensory memory and working memory.

trail made by a moving flashlight or a twirling Fourth-of-July sparkler. You can also hear the effects of fading sensory mem-ories in the blending of one note into another as you listen to a melody. In general, these short-lived images allow us to maintain incoming sensory information just long enough for it to be screened for importance by working memory.

Working memory, the second stage of processing, selectively takes information from the sensory registers and makes connections with items already in long-term storage. (It is this connection we mean when we say, "That rings a bell!") Working memory holds information for up to 20 to 30 seconds (Nairne, 2003), making it a useful buffer for temporarily holding a name you have just heard or fol-lowing directions someone has just given you. Originally, psychologists called this stage *short-term memory (STM)*, reflecting the notion that this was merely a short-term, pas-sive storage bin. Research has discovered, however, there are multiple active mental processes working at lightning speed to process information in this stage—hence the newer term *working memory*.

Long-term memory (LTM), the final stage of process-ing, receives information from working memory and can store it for long periods—sometimes for a lifetime. Infor-mation in long-term memory includes all our knowledge about the world, from an image of your mother's face to the lyrics to your favorite song and the difference between a psychologist and a psychiatrist. The core concept for this section captures the three stages in brief:

Each of the three memory stages encodes and stores memories in a different way, but they work together to transform sensory experience into a lasting record that has a pattern or meaning.

Our focus in this section will be on the unique contri-butions each stage makes to the final memory product (see Table 5.1). More specifically, we will look at each stage in terms of its storage capacity, its *duration* (how long it retains informa-tion), and its structure and function, and its biological basis.

By the end of this section, you will be able to:

5.2 Explain the role and limitations of sensory memory

5.3 Review the processes, function, and limitations of working memory

5.4 Describe the structure, function, and biology of long-term memory

Table 5.1 The Three Stages of Memory Compared

	Sensory Memory	Working Memory	Long-Term Memory
Function	Briefly holds information awaiting entry into working memory	Involved in control of attention Attaches meaning to stimulation Makes associations among ideas and events	Long-term storage of information
Encoding	Sensory images: no meaningful encoding	Encodes information (especially by meaning) to make it acceptable for long-term storage	Stores information in meaningful mental categories
Storage capacity	12–16 items	7 ± 2 chunks	Unlimited
Duration	From ¼ second to a few seconds	About 20 seconds unless repeatedly rehearsed	Unlimited
Structure	A separate sensory register for each sense	Central executive Phonological loop Sketchpad Episodic buffer	Procedural memory and declarative memory (further subdivided into semantic and episodic memory)
Biological basis	Sensory pathways	Involves the hippocampus and frontal lobes	Involves various parts of the cerebral cortex

5.2: The First Stage: Sensory Memory

Objective: **Explain the role and limitations of sensory memory.**

Your senses take in far more information than you can possibly use. As you read this book, they serve up all the words on the page, sounds in the room, the feel of your clothes on your skin, the temperature of the air, the slightly hungry feeling in your stomach . . . . How does the brain deal with this multitude of sensory inputs?

Like the trail of light from these sparklers, sensory memory holds incoming sensory information for just a brief moment.

It's the job of sensory memory to hold the barrage of incoming sensation just long enough for your brain to quickly scan it and decide which stream of information needs attention. But just how much information can sensory memory hold? Cognitive psychologist George Sperling answered this question by devising one of psychology's simplest and most clever experiments.

5.2.1: The Capacity and Duration of Sensory Memory

Sperling demonstrated that sensory memory can hold far more information than ever reaches consciousness. He first asked people to remember, as best they could, an array of letters flashed on a screen for a fraction of a second. (You might try glancing briefly at the array below and then trying to recall as many as you can.)

WATCH Letter Array
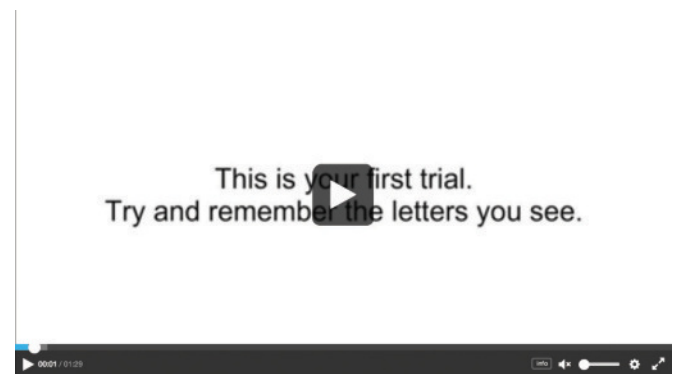
D	J	B	W
X	H	G	N
C	L	Y	K

Not surprisingly, most people could remember only three or four items from a fraction-of-a-second exposure.

But, Sperling wondered, could it be possible that far more information than these three or four items entered a temporary memory buffer but vanished before it could be reported? To test this conjecture, he modified the experimental task as follows. Immediately after the array of letters flashed on the screen, an auditory cue signaled which row of letters to report: A high-pitched tone indicated the top row, a medium tone the middle row, and a low tone meant the bottom row. Thus, immediately after seeing the brief image and hearing a beep, respondents were to report items *from only one row,* rather than items from the whole array.

Under this *partial report* condition, most people achieved almost perfect accuracy—no matter which row was signaled. That is, Sperling's volunteers could accurately report *any single row,* but *not all rows.* This result suggested that the actual storage capacity of sensory memory can be 12 or more items—even though all but three or four items usually disappear from sensory memory before they can enter consciousness (Sperling, 1960, 1963).

Would it be better if our sensory memories lasted longer so we would have more time to scan them? Probably not. With new information constantly flowing in, old information needs to disappear quickly, lest the system become overloaded. We are built so that sensory memories last just long enough to dissolve into one another and give us a sense of flow and continuity in our experience. Fortunately, they do not usually last long enough to interfere with new sensory impressions.

5.2.2: The Structure and Function of Sensory Memory

You might think of sensory memory as a sort of mental movie screen, where images are projected fleetingly and then disappear. In fact, this blending of images in sensory memory gives us the impression of motion in a "motion picture"—which is really just a rapid series of still images.

But not all sensory memory consists of visual images. We have a separate *sensory register* for each sense, with each register holding a different kind of sensory information, as shown in Figure 5.5.

Please note that images in sensory memory have no meaning attached to them—just as digital images have no meaning to a camera. It's the job of sensory memory simply to store the images very briefly. It's in the next stage, working memory, where the sensation takes on meaning.

5.2.3: The Biological Basis of Sensory Memory

The biology of sensory memory appears to be relatively simple. In this initial stage, memory images take the form of neural activity in the sense organs and their pathways to the brain. Thus, sensory memory consists of the rapidly fading trace of stimulation in our sensory systems (Bower, 2000b; Glanz, 1998). Working memory then "reads" these fading sensory traces and decides which ones will gain admittance into the spotlight of attention and which will be ignored and disappear.

5.3: The Second Stage: Working Memory

Objective: Review the processes, function, and limitations of working memory

In the second stage of processing, working memory serves as the temporary storage site for a new name you just heard or for the first part of this sentence while you read the remainder. More broadly, working memory is the processor of conscious experience, including information coming from sensory memory, as well as information being retrieved from long-term memory (Jonides and others, 2005). Everything entering consciousness does so through working memory.

Moreover, working memory provides a mental "work space" where we sort and encode information before adding it to more permanent storage (Shiffrin, 1993). In doing so, it makes experiences meaningful by blending them with information from long-term memory. To give a concrete example: Working memory is the mental file folder into which you retrieve the information you learned in yesterday's class as you review for tomorrow's test.

Figure 5.5 Sensory Memory into Working Memory

Only a tiny portion of what sensory memory captures is transferred to working memory, where it takes on meaning.
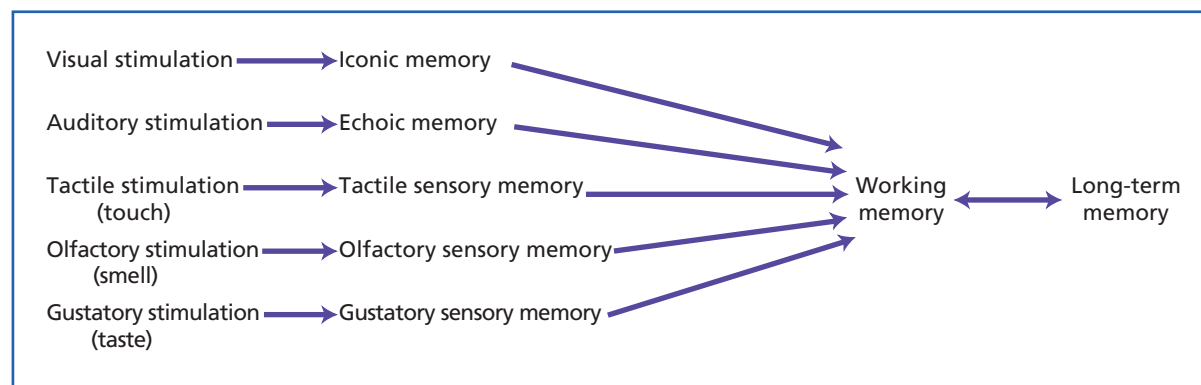
You might think of working memory, then, as the "central processing chip" for the entire memory system. In this role, it typically holds information for 20–30 seconds—far longer than sensory memory. If you make a special effort to rehearse the material, information can remain active even longer, as when you repeat a new phone number to yourself before putting it into your phone's contact list. It is also the mental work space in which we consciously mull over ideas and images pulled from long-term storage in the process we call thinking. In all these roles, then, working memory is not only the center of mental action but also the liaison among other components of memory.

5.3.1: The Capacity and Duration of Working Memory

Psychologist George Miller (1956) famously suggested that the "magic number" of this second stage of memory was 7 ± 2. What he meant was that the storage component of working memory holds about seven items. Newer research suggests our capacity is even lower, limited to three to five items (Cowan, 2010); Regardless of the exact number, working memory's storage capacity does vary slightly from person to person, so you may want to assess how much yours can hold by trying the test in the *Do It Yourself!* box.

Do It Yourself!
Finding Your Working Memory Capacity

Look at the following list of numbers and scan the four-digit number, the first number on the list. Don't try to memorize it. Just read it quickly; then look away from the page and try to recall the number. If you remember it correctly, go on to the next longer number, continuing down the list until you begin to make mistakes.

How many digits are in the longest number that you can squeeze into your working memory?

```
7 4 8 5
3 6 2 1 8
4 7 9 1 0 3
2 3 8 4 9 7 1
3 6 8 9 1 7 5 6
7 4 7 2 1 0 3 2 4
8 2 3 0 1 3 8 4 7 6
```

Show Result

The result is your digit span, or your working (short-term) memory capacity for digits. Studies show that, under ideal testing conditions, most people can remember five to nine digits. If you remembered more, you may have been using special "**chunking**" techniques.

When we overload working memory, older items usually drop away to accommodate newer ones. Yet, when working memory fills up with information demanding attention, we can fail to notice new information streaming into our senses. That's why, in the opinion of many experts, this limited capacity of working memory makes it unsafe to use your cell phone while driving (Wickelgren, 2001). In fact, research finds we only process about 50% of incoming sensory information when we are concurrently driving and talking on a cell phone—even when the driver is using a hands-free set. More than one in four auto accidents result from driving while using a cell phone—which adds up to more than 1.3 million accidents caused by cell phone use while driving. And texting while driving makes you up to 26 times more likely to crash (National Safety Council, 2013).

Note that working memory's meager storage capacity is significantly smaller than that of sensory memory. In fact, working memory has the smallest capacity of the three memory stages. This constraint, combined with its limited duration, makes working memory the information "bottleneck" of the memory system (see Figure 5.6). These twin problems of limited capacity and short duration present special obstacles for students trying to process and remember large amounts of information from a lecture or textbook. Fortunately, there are ways to work around these difficulties, as we will see.

Figure 5.6 The Working Memory Bottleneck

Caught in the middle, with a much smaller capacity than sensory and long-term memories, working memory becomes an information bottleneck in the memory system. As a result, much incoming information from sensory memory is lost.
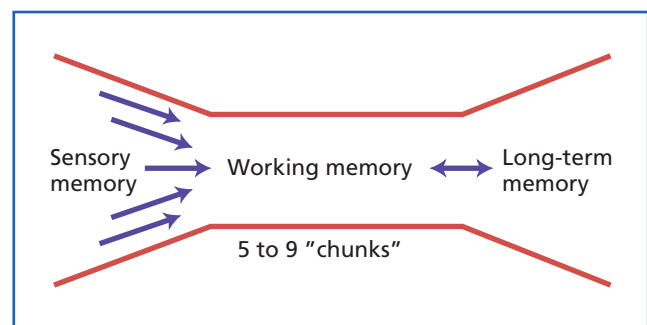
CHUNKS AND CHUNKING In memory, a chunk is any pattern or meaningful unit of information. It might be a single letter or number, a name, or even a concept. For example, the letters P-H-I-L could constitute four chunks. However, you probably recognize this sequence as a name, so you can combine the four letters into a single chunk. Thus, **chunking** helps you get more material into the seven slots of working memory.

The phone companies capitalized on chunking years ago. When they originally grouped the seven digits of a phone number (e.g., 8675309) into two shorter strings of numbers (867-5309), they helped us collapse seven separate items into two chunks—and now, with the addition of the area code conveniently chunked as well, we have only one additional thing to remember. The government uses the same chunking principle to help us remember our nine-digit Social Security numbers. Similarly, if you need to go to the grocery store and don't have a list, you might group your necessary purchases into categories: vegetables, dairy, and canned goods, for example.

THE ROLE OF REHEARSAL Imagine you are ordering pizza, and you ask your roommates what toppings they want. To keep their list in your working memory while you call the pizza place, you might repeat it to yourself over and over. This technique is called **maintenance rehearsal**, and it serves us well for maintaining information temporarily in consciousness by preventing competing inputs from crowding it out. But repetition is not an efficient way to transfer information to long-term memory, even though people often attempt to do so. Thus, using this strategy to try to learn material for a test won't work very well.

Far better is a strategy known as **elaborative rehearsal**. With this method, information is not merely repeated but is actively connected to knowledge already stored. One way to do this is to associate a new idea with something it logically brings to mind for you. When you read about echoic memory as the term for auditory sensory memory, did you think

"that makes sense, since echoes have to do with sound?" Another way is to think of personal examples of concepts. When you learned about chunking in the previous section, for example, try thinking of a time you used that strategy to help yourself remember a longer list of numbers of items—that type of elaborative rehearsal is very effective in improving memory. One caution about elaborative rehearsal: Make sure you have your facts straight before creating a web of connections for them! If, for example, you erroneously believe that memory is like a video recorder and think for a moment about how that makes sense, you are reinforcing a false memory. Likewise, if the therapist treating Donna (at the beginning of this chapter) told her to imagine situations where her dad may have had opportunities to molest her, merely imagining those events could help create false memories (Loftus, 1997; Zaragoza and others, 2011).

5.3.2: The Structure and Function of Working Memory

When we introduced you to the concept of working memory at the beginning of this section, we said its name reflected the active nature of this stage of the memory process. So what are the activities working memory engages in? Currently, researchers Allen Baddeley and his colleagues believe there are four: the central executive, the phonological loop, the sketchpad, and an episodic buffer (Baddeley, 2007; Baddeley & Hitch, 1974). Let's take a closer look at each one (see Figure 5.7).

Figure 5.7 A Model of Working Memory

Baddeley's (2003) updated version of working memory includes a *central executive* that directs attention, a *sketchpad* for visual and spatial information, a *phonological loop* for sounds, and an *episodic buffer* that can combine many kinds of information into memories of events.
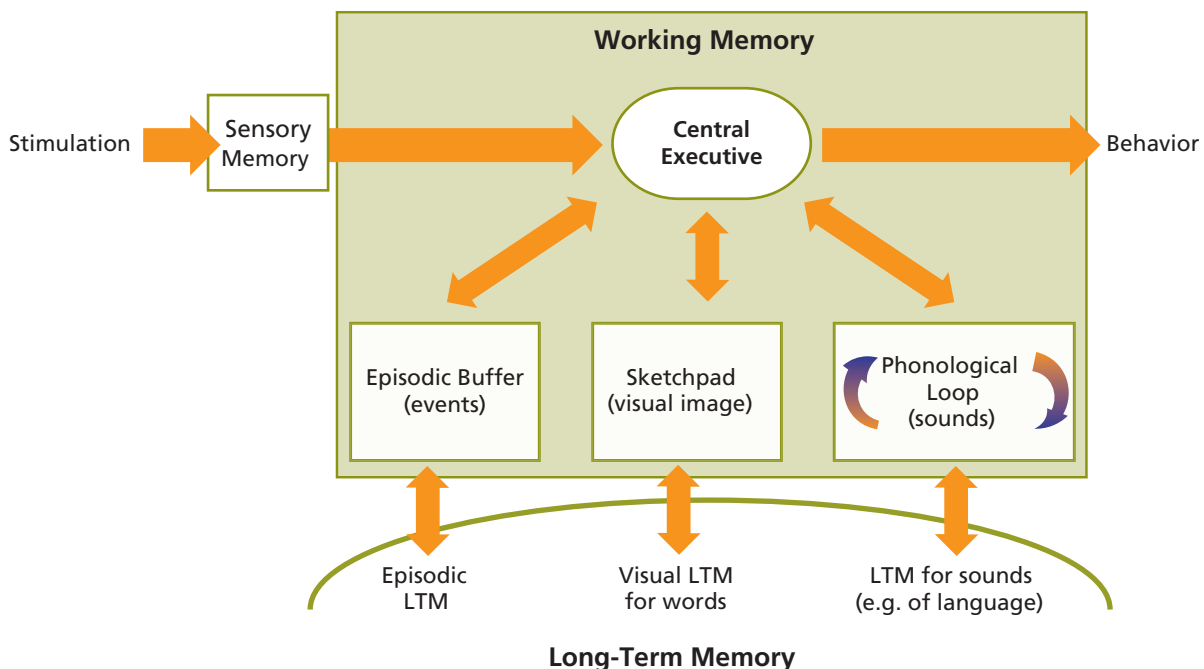
THE CENTRAL EXECUTIVE   The information clearinghouse for working memory, the *central executive,* directs your attention to important input from both sensory memory and long-term memory and interfaces with the brain's voluntary (conscious) response system. Even now, as you sit reading this text, the central executive in your working memory is helping you decide whether to attend to these words or to other stimuli flowing in from your other senses, along with thoughts from long-term memory.

ACOUSTIC ENCODING: THE PHONOLOGICAL LOOP   When you read words like "whirr," "pop," "cuckoo," and "splash," you can hear in your mind the sounds they describe. This **acoustic encoding** also happens with words that don't have imitative sounds. That is, working memory converts all the words we encounter into the sounds of our spoken language and shuttles them into its phonological loop—whether the words come through our eyes, as in reading, or our ears, as in listening to speech (Baddeley, 2001). There, working memory maintains the verbal patterns in an acoustic (sound) form as they are processed.

Acoustic encoding can create its own brand of memory errors. When people recall lists of letters they have just seen, their mistakes often involve confusions of letters that have similar *sounds*—such as D and T—rather than letters with a similar *appearance*—such as E and F (Conrad, 1964). Mistakes aside, however, acoustic encoding has its advantages, particularly in learning and using language (Baddeley and others, 1998; Schacter, 1999).

VISUAL AND SPATIAL ENCODING: THE SKETCHPAD   Serving much the same function for visual and spatial information, working memory's *sketchpad* encodes visual images and mental representations of objects in space. It holds the visual images you mentally rummage through when you're trying to remember where you left your car keys. It also holds the mental map you follow from home to class. Neurological evidence suggests that the sketchpad requires coordination among several brain systems, including the frontal and occipital lobes.

BINDING INFORMATION TOGETHER: THE EPISODIC BUFFER   The most recent addition to Baddeley's model of working memory, the *episodic buffer* appears to bind the individual pieces of information in working memory—such as the sounds, the visual information, and other sensory input—into a coherent episode. In doing so, it acts as a temporary storage facility for that current information while we compare it to knowledge in our long-term memory that will help us make sense of it. Episodic memory is what enables us to remember story lines of movies and other events, as it provides a place to organize the visual, spatial, phonological, and chronological aspects into a single memorable episode (Baddeley, 2003).

5.3.3: Levels of Processing in Working Memory

Here's an important tip: The more connections you can make in working memory between new information and knowledge you already have, the more likely you are to remember it later. Obviously this requires interaction between working memory and long-term memory. According to the **levels-of-processing theory** proposed by Fergus Craik and Robert Lockhart (1972), "deeper" processing—establishing more connections with long-term memories—makes new information more meaningful and more memorable. A famous experiment (see Figure 5.8, p. 164) will illustrate this point.

This concept is one of the best memory tips you can apply to your studying! You can engage in a deeper level of processing of material you are trying to learn by putting the concept into your own words, the way you might teach it to someone who doesn't know about it. Adding examples from your own life that illustrate the concept—a type of **elaborative rehearsal**—takes your processing to an even deeper level.

WRITING PROMPT

Applying Levels of Processing to Your Studying

Based on what you've learned about Craik and Tulving's experiment, consider your own study practices. Compare the common student practice of highlighting material versus taking notes on the material. From the standpoint of levels of processing, which strategy would you predict would result in the best memory for the material, and why? If you are taking notes, should you copy the important points as they are written in the text, or translate them into your own words? Explain your answer.

▶ | The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

5.3.4: The Biological Basis of Working Memory

Although some details remain unclear, working memory probably holds information in the form of messages flashed repeatedly in nerve circuits. Brain imaging implicates brain regions in the frontal cortex (Beardsley, 1997; Smith, 2000), which in turn project to all sensory parts of the brain and areas known to be involved in long-term storage. Brain imaging also suggests the frontal lobes house some anatomically distinct "executive processes" that focus attention on information in short-term storage (Smith & Jonides, 1999). Together, these brain modules direct attention, set priorities, make plans, update the contents of working memory, and monitor the time sequence of events.

Figure 5.8 Levels of Processing Influence Memory

Craik and one of his research partners had volunteers examine a list of 60 common words presented on a screen one at a time (Craik and Tulving, 1975). As each word appeared, experimenters asked questions designed to influence how deeply each word was processed.

Is it in capital letters?

BEAR

Does it rhyme with *chair*?

Is it an animal?
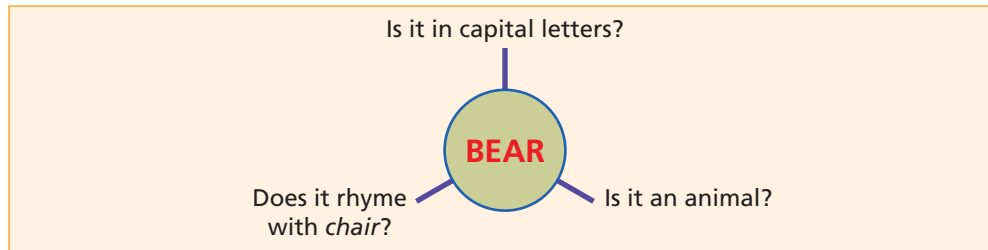
Craik and Tulving theorized that merely thinking about capital letters would not require processing the word as deeply as would comparing its sound with that of another word. But the deepest level of processing, they predicted, would occur when some aspect of the word's meaning was analyzed, as when they asked whether BEAR was an animal. Thus, they predicted that items processed more deeply would leave more robust traces in memory.
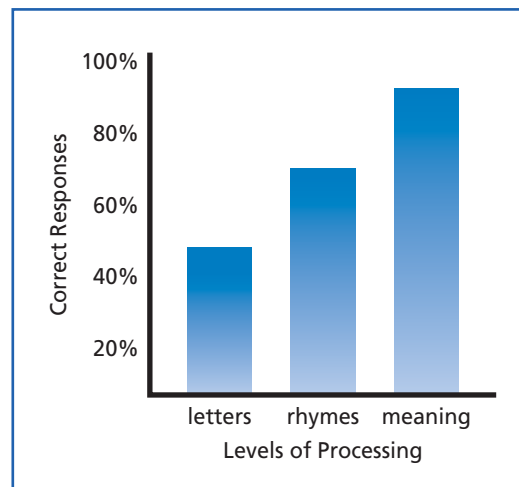
5.4: The Third Stage: Long-Term Memory

Objective: **Describe the structure, function, and biology of long-term memory**

Do you remember who discovered classical conditioning? Can you ride a bicycle? How many birthdays have you had? Such information, along with everything else you know, is stored in your long-term memory (LTM), the last of the three memory stages.

Given the vast amount of data stored in LTM, it is a marvel that we can so easily gain access to so much of it. Remarkably, if someone asks your name, you don't have to rummage through a lifetime of information to find the answer. The method behind the marvel involves a special feature of long-term memory: Words and concepts are encoded by their meanings. This connects them, in turn, with other items that have similar meanings. Accordingly, you might picture LTM as a huge web of interconnected associations. As a result, good retrieval cues (stimuli that prompt the activation of a long-term memory) can navigate though the web and help you quickly locate the item you want amid all the data stored there.

5.4.1: The Capacity and Duration of Long-Term Memory

How much information can long-term memory hold? As far as we know, it has unlimited storage capacity. (No one

has yet maxed it out, so you don't have to conserve memory by cutting back on your studying.) LTM can store the information of a lifetime: all the experiences, events, information, emotions, skills, words, categories, rules, and judgments that have been transferred from working memory. Thus, your LTM contains your total knowledge of the world and of yourself. This makes long-term memory the clear champion in both duration and storage capacity among the three stages of memory. But how does LTM manage to have unlimited capacity? That's another unsolved mystery of memory. Perhaps we might conceive of LTM as a sort of mental "scaffold," so the more associations you make, the more information it can hold.

5.4.2: The Structure and Function of Long-Term Memory

With a broad overview of LTM in mind, let's look at some of the details of its two main components.

1. One, a register for the things we know how to do, is called **procedural memory**.
2. The other, which stores information we can describe— facts we know and experiences we remember—is called **declarative memory**.

We know that procedural and declarative memory are distinct because brain-damaged patients may lose one but not the other (as we will see).

PROCEDURAL MEMORY   We call on **procedural memory** when riding a bicycle, tying shoelaces, or playing a musical instrument. Indeed, we use procedural memory to store the mental directions, or "procedures," for all our well-practiced skills (Schacter, 1996).

Procedural memories, similar to what some call "muscle memories," are deeply ingrained and resistant to forgetting. Even if you haven't ridden a bicycle in many years, if you used to know how, chances are you can still do it.

Much of procedural memory operates outside of awareness: Only during the early phases of training, when we must concentrate on every move we make, must we think consciously about the details of our performance. Later, after the skill is thoroughly learned, it operates largely beyond the fringes of awareness, as when a concert pianist performs a piece without consciously recalling the individual notes. (Figure 5.9, p. 166 should help you clarify the relationship between the two major components of long-term memory.)

DECLARATIVE MEMORY   We use **declarative memory** to store facts, impressions, and events. Recalling the major perspectives in psychology or your most memorable vacation depends on declarative memory. In contrast with procedural memory, using declarative memory typically requires conscious mental effort, as you see when people roll their eyes or make facial gestures while trying to recall facts or experiences.

To complicate matters, declarative memory itself has two major subdivisions, **episodic memory** and **semantic memory**. One deals with the rich detail of personal experiences (your first kiss), while the other simply stores information, without an "I-remember-when" context— information like the multiplication tables or the capital of your state.

1. **Episodic memory** stores your memories of events, or "episodes," in your life. It also stores *temporal coding* (or time tags) to identify *when* the event occurred and *context coding* that indicates *where* it took place. For example, you store memories of your recent vacation or of an unhappy love affair in episodic memory, along with codes for where and when these episodes occurred. In this way, episodic memory acts as your internal diary or autobiographical memory. You consult it when someone says, "Where were you on New Year's Eve?" or "What did you do in class last Tuesday?"
2. **Semantic memory** is the other division of declarative memory. (Refer to Figure 5.9 if this is becoming confusing.) It stores the basic meanings of words and concepts. Usually, semantic memory retains no information about the time and place in which its contents were acquired. Thus, you keep the meaning of *cat* in semantic memory—but probably not a recollection of the occasion on which you first learned the meaning of cat. In this respect, semantic memory more closely resembles an encyclopedia or a database than an autobiography. It stores a vast quantity of facts about names, faces, grammar, history, music, manners, scientific principles, and religious beliefs. All the facts and concepts you know

---

Figure 5.9 Components of Long-Term Memory

Declarative memory involves knowing specific information—knowing "what." It stores facts, personal experiences, language, concepts—things about which we might say, "I remember!" *Procedural memory* involves knowing "how"—particularly motor skills and behavioral learning.

Long-term memory

Procedural memory (knowing how)

Includes memory for:
  motor skills
  operant conditioning
  classical conditioning

Declarative memory (knowing what)

Semantic memory

Includes memory for:
  language
  facts
  general knowledge
  concepts

Episodic memory

Includes memory for:
  events
  personal experiences

---
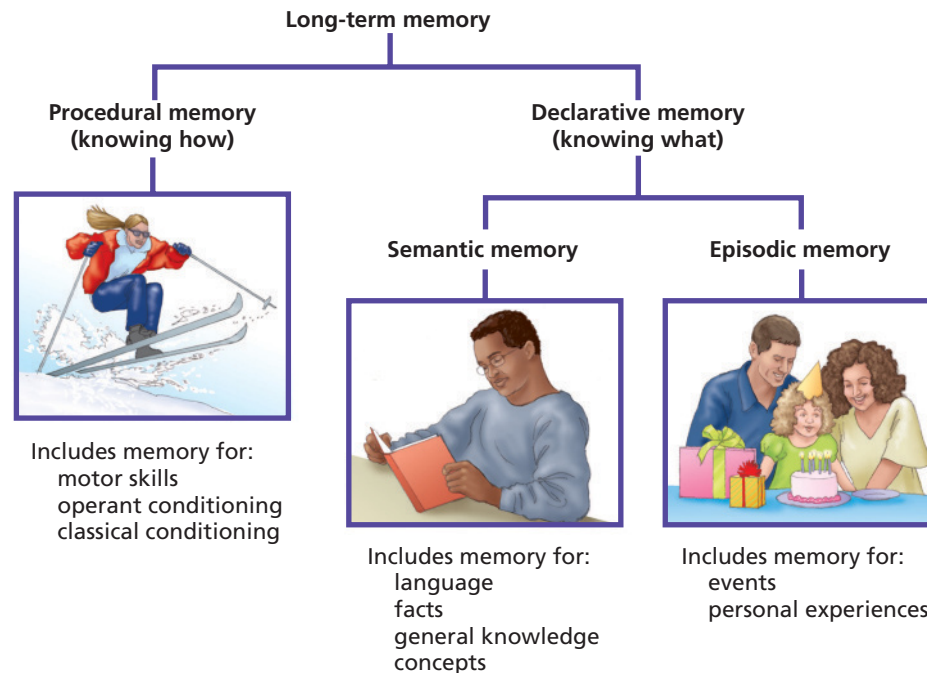
are stored there, and you consult its registry when someone asks you, "Who was the third president?" or "What are the two major divisions of declarative memory?"

SCHEMAS   When you attend a class, have dinner at a restaurant, make a phone call, or go to a birthday party, you know what to expect, because each of these events involves familiar scenarios. Cognitive psychologists call them **schemas**: clusters of knowledge in semantic memory that give us a context for understanding events (Squire, 2007). The exact contents of our schemas depend, of course, on culture and personal experience, but the point is that we invoke schemas to make new experiences meaningful.

Schemas allow us quick access to information. So if someone says "birthday party," you can immediately draw on information that tells you what you might expect to be associated with a birthday party, such as eating cake and ice cream, singing "Happy Birthday," and opening presents. Just as important, when you invoke your "birthday party" schema, you don't have to sort through irrelevant knowledge in your memory—such as information contained in your "attending class" schema or your "dinner at a restaurant" schema. See for yourself how helpful schemas can be in the *Do It Yourself* box.

Do It Yourself!
How Schemas Impact Memory

Schemas in Action

Read the following passage carefully:

Chief Resident Jones adjusted his face mask while anxiously surveying a pale figure secured to the long gleaming table before him. One swift stroke of his small, sharp instrument and a thin red line appeared. Then the eager young assistant carefully extended the opening as another aide pushed aside glistening surface fat so that the vital parts were laid bare. Everyone stared in horror at the ugly growth too large for removal. He now knew it was pointless to continue.

Now, without looking at the passage, please complete the following exercise. Recollect the words that appeared in the passage:

patient	scalpel	blood	tumor
cancer	nurse	disease	surgery

In the original study, most of the subjects who read this passage circled the words *patient*, *scalpel*, and *tumor*. Did you? However, none of the words were there!

Interpreting the story as a medical story made it more understandable, but also resulted in inaccurate recall (Lachman and others, 1979). Once the subjects had related the story to their schema for hospital surgery, they "remembered" labels from their schema that were not present in what they had read. So while schemas help us organize information, they also create ample opportunity for errors in encoding and retrieval—which may create false memories, as we unconsciously modify information to make it more consistent with our schema-based expectations.

You can see, then, how schemas can play a key role in memory errors: When recalling a situation or event, we fill in the gaps in our memory based on our expectations—without realizing we are doing so. On the plus side, schemas often function as an important aid to long-term memory when they help us make sense out of new information by giving us a ready-made framework for it. The problem is that we don't usually know whether a memory is based on accurate information, or if it contains information we have unconsciously inserted based on our schemas and assumptions.

EARLY MEMORIES   Most people have difficulty remembering events that happened before their third birthday, a phenomenon called **childhood amnesia**. This suggests that younger children have limited **episodic memory** ability. Learning clearly occurs, however, long before age 3, probably from the moment of birth. We see this in a baby who learns to recognize a parent's face or in a toddler learning language. Thus, we know that very young children have, at least, a **semantic memory** and a **procedural memory**.

Until recently, psychologists thought childhood amnesia occurs because young children's brains have not yet formed neural connections required for episodic memory. Now, however, we know that the brain has begun to create necessary circuits by the end of the first year of life. For example, cognitive scientists have found children as young as 9 months showing some signs of episodic memory in the ability to imitate behaviors they have observed after a delay (Bauer and others, 2003). So why can't you remember your first birthday party? Part of the answer probably involves rudimentary language skills (for verbal encoding of memories), the lack of a sense of self (necessary as a reference point, but which doesn't develop until about age 2), and the lack of the complex schemas older children and adults use to help them remember.

Culture also influences people's early memories. For example, the earliest memories of Maori New Zealanders go back to 2.5 years, while Korean adults rarely remember anything before the age of 4. The difference seems to depend on how much the culture encourages children to tell detailed stories about their lives. "High elaborative" parents spend a lot of time encouraging children to talk about their daily experiences. This seems to strengthen early memories, enabling them to persist into adulthood (Leichtman, 2006; Winerman, 2005a). You can use that information to improve your own learning and remembering, by talking about what you are learning so that you create stronger memories for it!

5.4.3: The Biological Basis of Long-Term Memory

Scientists have searched for the **engram**, the biological basis of long-term memory, for more than a century. One of their tactics involves looking for neural circuitry the brain uses to forge memories. Another approach goes to the level of synapses, looking for biochemical changes that might represent the physical memory trace within nerve cells. A tragic figure known as H. M. represents the first of these two approaches.

CLUES FROM THE CASE OF H. M.   As a young man in 1953, Henry Molaison lost most of his ability to form new memories—the result of an experimental brain operation performed as a last-ditch effort to treat his frequent epileptic seizures (Corkin, 2002; Hilts, 1995). From that point on, Henry—known only as H. M. to the science world for the remainder of his life, to protect his privacy—was almost completely unable to create new memories of events in his life. So profound was his memory impairment that he never even learned to recognize the people who cared for him in the decades after his surgery.

Remarkably, H. M.'s memory for events prior to the operation remained normal, even as new experiences slipped away before he could store them in LTM. He knew nothing of the 9/11 attacks, the moon landings, or the computer revolution. He couldn't remember what he had for breakfast or the name of a visitor who left 2 minutes before. Ironically, one of the few things he was able to retain was that he had a memory problem. Even so, he was mildly surprised to see an aging face in the mirror, expecting the younger man he had been in 1953 (Milner and others, 1968; Rosenzweig, 1992). Yet, throughout his long ordeal, he maintained generally good spirits and worked willingly with psychologist Brenda Milner, whom he never could recognize, even after working with her for years.

H. M.'s medical record listed his condition as **anterograde amnesia**. To put the problem in cognitive terms, H. M. had a severe impairment in his ability to transfer new concepts and experiences from working memory to long-term memory (Scoville & Milner, 1957). From a biological perspective, the cause was removal of the **hippocampus** and **amygdala** on both sides of his brain.

What did we learn from H. M.? Again speaking biologically, he taught us that the hippocampus and amygdala are crucial to laying down *new* declarative memories, although they seem to have no role in retrieving *old* (well-remembered) memories (Bechara and others, 1995; Wirth and others, 2003). Further, as we will see in a moment, H. M.'s case helped us understand the distinction between **procedural memories** and **declarative memories**. Remarkably, H. M. remained upbeat about his condition—even joking about his inability to remember—although, ironically, the removal of his amygdalas may have contributed to his positive disposition (Corkin, 2002).

When H. M. looked in a mirror, his age surprised him, as he had no memory of the years since his brain surgery as a young man.

PARTS OF THE BRAIN ASSOCIATED WITH LONG-TERM MEMORY In the last two decades, neuroscientists have added much to the picture H. M. gave us of human memory. We now know the hippocampus is implicated in Alzheimer's disease, which also involves loss of ability to form new declarative memories. Neuroscientists have also discovered that the hippocampus's neural neighbor, the amygdala, processes memories that have strong emotional associations (Bechara and others, 1995). These emotional associations, it seems, act as an aid for quick access and retrieval (Dolan, 2002). The amygdala, then, plays a role in the persistent and troubling memories reported by soldiers and others who have experienced violent assaults. In some cases, these memories can be so disturbing that they constitute a condition known as **posttraumatic stress disorder**. Importantly, this same biological basis of emotional memories contributes to the lasting quality of most traumatic memories.

Are memories, then, stored in the hippocampus and the amygdala? No. Memories for events and information (declarative memories) are actually stored throughout the cerebral cortex, with various pieces of a memory each stored in the part of the cortex that initially processed that particular sensory signal. So, for example, the memory of the great vacation you had at the beach last summer would have the visual components of the memory in your visual cortex, the sounds in the auditory cortex, the smells in the olfactory bulb, the sequence of events in the frontal lobes, and so forth. And, if you learned how to surf while you were there, that memory would be linked to the cerebellum

and the motor cortex—just like other procedural memories that involve body movements and muscle memory.

How, you might wonder, do all these memory fragments get put back together properly? (In other words, how does the surfing memory end up with the other beach memories, rather than being misfiled with memories of your last visit to the dentist?) While the technical details of this fantastic feat remain a mystery to neuroscientists, we do know one part of the brain that plays a starring role. In the process known as memory **consolidation**, memories gradually become more permanent with the help of the hippocampus. Essentially, each time we retrieve a new declarative memory, pieces of that memory from all over the brain come together in the hippocampus, which somehow sorts through them and reassembles the relevant ones into a coherent memory. Each time, the neural pathway for that particular memory becomes stronger, so eventually the memory doesn't need the hippocampus to bind it together. At that point, any single piece of the memory (for example, the smell of the ocean) is enough to produce the entire memory.

Understanding more about memory storage and consolidation reveals why H. M. could not form new declarative memories—without hippocampi, his brain was missing the hardware needed for these projects. Older memories, which had already been consolidated and thus didn't need the hippocampus for retrieval, remained accessible. It also explains why his ability to form new procedural memories remained intact, as these memories do not involve the hippocampus. And, for those of us with intact hippocampi, researchers report that new experiences consolidate much more rapidly if they are associated with existing memory **schemas** (Squire, 2007; Tse and others, 2007)—providing a biological explanation for why **elaborative rehearsal** and **depth of processing** help us create more lasting memories.

MEMORIES, NEURONS, AND SYNAPSES A standard plot in soap operas and movies depicts a person who develops *amnesia* (loss of memory) after a blow or injury to the head. But does research support this Hollywood neuroscience? At the level of individual neurons, memories form initially as fragile chemical traces at the synapse and, over time and with repeated retrieval and elaboration, consolidate into more permanent synaptic changes. During this consolidation process, memories are especially vulnerable to interference by new experience, certain drugs, or a blow to the head (Doyère and others, 2007). The diagnosis, in the event of significant memory loss, would be **retrograde amnesia**. (Note that retrograde amnesia is the opposite of H. M.'s problem, **anterograde amnesia**.)

Memories, then, can be strengthened or weakened during consolidation. Further, a person's emotional state can influence the process, although positive and negative emotions have vastly different effects on attention and therefore on memory. If you are happy, you tend to look at situations

Figure 5.10 Your Brain on Stress

Stressful events trigger the release of stress hormones in the brain, which act on the amygdala and hippocampus to strengthen the emotional memory of that event. Thus—contrary to the popular myth that we forget or repress memories of stressful events—we are more likely to remember them.
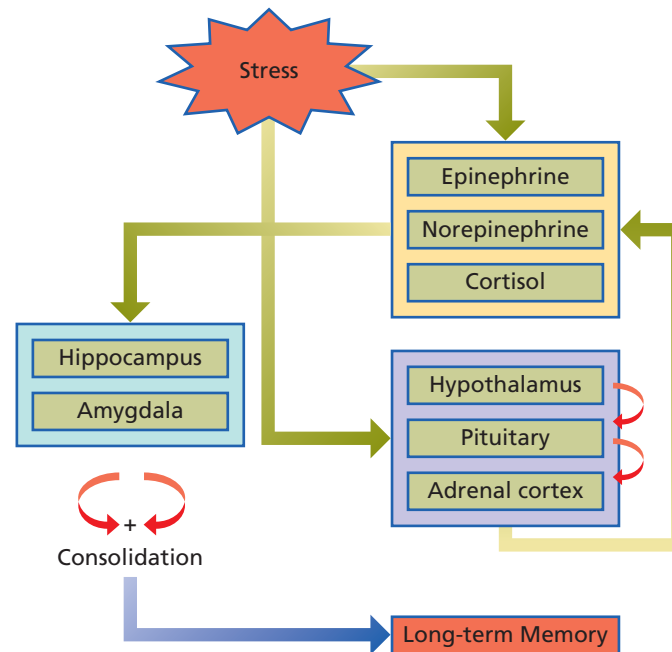
broadly and remember the "big picture." But if you are being robbed at gunpoint, you will most likely attend to the gun while paying less attention to details of the robber's appearance. In general, we can say that emotional arousal accounts for our most vivid memories, but not our most precise ones: The scope of happy memories tends to be larger, as negative emotions tend to restrict the focus of our memories (Dingfelder, 2005; Levine & Bluck, 2004).

Before leaving this section, we should note that from an evolutionary perspective, emotion plays a highly adaptive role in memory (see Figure 5.10). If you survive a frightening encounter with a bear, for example, you are likely to remember to avoid bears in the future. For this, we can thank the amygdala, as well as emotion-related chemicals such as epinephrine (adrenalin) and certain stress hormones. Together, they enhance memory for emotion-laden experiences via the "supercharged" emotional associations they create (McGaugh, 2000).

Psychology Matters

"Flashbulb" Memories: Where Were You When . . . ?

The closest most people will come to having a "photographic memory" is a **flashbulb memory**, an exceptionally clear recollection of an important and emotion-packed event (Brown & Kulik,

1977). You probably harbor several such memories: a graduation, a tragic accident, a death, a big victory. It feels as though you made an instant picture in your mind of the striking scene. (The term was coined in the days when flash photography required a "flashbulb" for each picture.) The defining feature of a flashbulb memory is the source of the memory (Davidson and others, 2005): vivid images of where the individuals were at the time they received the news, what they were doing, and the emotions they felt.

Do you remember where you were and how you felt when Barack Obama won the 2008 presidential election? Chances are, your flashbulb memory is not as accurate as you think it is.

Many people form flashbulb memories of emotionally charged events in the news, such as the Boston marathon bombing, the September 11 attacks, or the election of Barack Obama as president (Pillemer, 1984; Schmolck and others, 2000). Cognitive psychologists take advantage of these naturally occurring opportunities for research and, in this case, use them to find the answer to this important question: Does the emotionally charged nature of flashbulb memories affect their accuracy?

One study at Duke University collected students' memories of the September 11 attacks the day after the event (Talarico & Rubin, 2003). Researchers also gathered memories of a normal, everyday event from the same participants. Thirty-two weeks later, participants' memories were tested for accuracy. The result? On average, flashbulb memories were no more accurate than everyday memories—both types of memories declined in accuracy over time. Importantly, however, participants' confidence in the flashbulb memories was quite high: Students were more confident about the accuracy of their flashbulb memories than their everyday memories, but it was false confidence! Significantly, confidence level for the flashbulb memories correlated with the initial level of emotional arousal during the flashbulb event. Other studies have corroborated the notion that emotional arousal increases the vividness of the memory—but not necessarily the accuracy of the memory.

How do we make sense of these findings, given the strong evidence that exists for enhanced recollection of personal emotional events? First, we must note that flashbulb memories are rarely the same as a memory of personal involvement in a traumatic event. Flashbulb memories are often of publicly known, widely shared events—on an individual level, we may not have personal involvement in the situation. Thus, the public event is likely to be all over the news, discussed widely, and retold frequently. And in these frequent tellings, by many different people, details are likely to become distorted.

As the saying goes, then, the devil may be in the details. Flashbulb memory studies reveal that certain vivid details are often remembered with great accuracy, but also—especially over time—other, equally vivid details fail the accuracy test. One study of Israeli students, in the wake of the assassination of Prime Minister Itzhak Rabin, found that only about two-thirds of vividly reported memories were still accurate after 11 months (Nachson & Zelig, 2003)—although confidence in the erroneous memories remained high. As we noted earlier, traumatic events narrow the scope of our attention; thus, we encode only certain details and later fill in that sketch—quite unconsciously—with details we have heard from others or details that fit our schema for the event.

Even though this creates the potential for memory errors, the mistaking of confidence for accuracy may serve an adaptive purpose. Evolutionary psychologists suggest that, in times of stress, the ability to make a quick and confident decision might make the difference between life and death (Poldrack and others, 2008). In that way as well, the devil may truly be in the details.

Key Question: How Do We Retrieve Memories?

| **Core Concept 5.3**

Whether memories are implicit or explicit, successful retrieval depends on how they were encoded and how they are cued.

Memory can play several surprising tricks during retrieval. One involves the possibility of retrieving a memory you

didn't know you had—which tells us that some memories can be successfully encoded and stored without full awareness. Another quirk involves our confidence in recollections—as we saw in flashbulb memories. The core concept for this section summarizes the retrieval process this way:

| Whether memories are implicit or explicit, successful retrieval depends on how they were encoded and how they are cued.

By the end of this section, you will be able to:

5.5 Evaluate retrieval cues that aid memory

5.5: Implicit and Explicit Memory

Objective: Evaluate retrieval cues that aid memory

We begin this section with a curious question: Are you always aware of your own memories? **H. M.** wasn't: despite his normal **procedural memory** for motor tasks, he couldn't remember learning these skills and didn't even know he knew them. But you don't have to have brain damage like H. M. to be unaware of some of your own memories. A normal memory has disconnected islands of information, too. For more than 100 years, psychologists have realized that people with no memory defects can know something without knowing they know it. Psychologist Daniel Schacter (1992, 1996) calls this **implicit memory**: memory that can affect your behavior without coming into full awareness. By contrast, **explicit memory** requires conscious awareness.

Procedural memories are often implicit, as when golfers remember how to swing a club without thinking about how to move their bodies. But implicit memories are not limited to procedural memory—nor is explicit memory the same as **declarative memory**. Information in your **semantic memory** store can be either explicit (such as in remembering the material you have studied for a test) or implicit (such as knowing the color of the building in which your psychology class is held). The general rule is this: A memory is implicit if it can affect behavior or mental processes without becoming conscious. Explicit memories, on the other hand, always involve consciousness during storage and retrieval.

In a striking set of studies, Skotko and others (2004) found that H. M. could learn some new semantic material through implicit channels—that is, even though he didn't know he learned it. To do this, Skotko's group exploited H. M.'s favorite pastime of doing crossword puzzles. They devised crosswords that linked new information with knowledge H. M. had at the time of his operation: For

example, H. M. knew that polio was a dreaded disease, but the polio vaccine was not discovered until after his surgery, so he had no knowledge of it. Yet by working on a specially designed crossword puzzle over a 5-day period, H. M. learned to respond correctly to the item, "childhood disease successfully treated by Salk vaccine." Similarly, he was able to learn that Jacqueline Kennedy, wife of assassinated President John Kennedy, subsequently became Jacqueline Onassis. This technique, then, showed that H. M.'s problem was primarily one of explicit memory, rather than semantic memory.

5.5.1: Retrieval Cues

For accurate retrieval, both implicit and explicit memories require good cues. You have some understanding of such cues if you've ever used search terms in Google or another Internet search engine: Make a poor choice of terms, and you come up either with nothing or with Internet garbage. Long-term memory works much the same way, where a successful search requires good mental **retrieval cues**. Sometimes the only retrieval cue required to reactivate a long-dormant experience is a certain aroma, such as the smell of fresh-baked cookies you associated with visiting Grandma's house. Other times, the retrieval cue might be an emotion, as when a person struggling with depression gets caught in a maelstrom of depressing memories. In our story of Ross at the beginning of the chapter, something in his dream may have served as a retrieval cue for the memory he had long forgotten.

On the other hand, some memories—especially semantic ones—are not so easily cued. During a test, for example, you may draw a blank if the wording of a question doesn't match the way you framed the material in your mind as you were studying. In other words, your memory may fail if the question isn't a good retrieval cue. In general, whether a retrieval cue is effective depends on the type of memory being sought and the web of associations in which the memory is embedded. The take-home lesson here? The more extensive your web of associations, the greater the chance of retrieving the information. Let's examine ways you can use this information to your advantage.

THE IMPORTANCE OF MEANINGFUL ORGANIZATION The best way to ensure accurate retrieval is to make information meaningful during the encoding process. This means that you must associate new information with things you already know when you first encounter it. Sometimes it is important to remember all the details accurately (as in memorizing a mathematical formula), while at other times the important thing is to remember the gist. In attempting to remember the gist, it is especially important to think of personal examples of the concepts

and ideas you want to remember. We have called that process **elaborative rehearsal**. Encoding many such connections by elaborative rehearsal gives you more ways of accessing the information, much as a town with many access roads can be approached from many directions. (Are you getting into the habit of identifying personal examples of chapter concepts yet?)

RETRIEVING IMPLICIT MEMORIES BY PRIMING A quirk of implicit memory landed former Beatle George Harrison in court (Schacter, 1996). Lawyers for a singing group known as the Chiffons claimed the melody in Harrison's song "My Sweet Lord" was nearly identical to that of the Chiffons classic "He's So Fine." Harrison denied that he deliberately borrowed the melody, but conceded he had heard the Chiffons's tune prior to writing his own. The court agreed, stating that Harrison's borrowing was a product of "subconscious memory." More recently, Pharrell Williams acknowledged Marvin Gaye's influence on his music, but flatly denied stealing elements from Gaye's "Got To Give It Up" when co-writing the mega-hit "Blurred Lines." In that 2015 case, the court was not swayed by Williams' statements, and instead awarded millions to Gaye's survivors. The cases were similar, but the verdicts different, illustrating the blurred lines of implicit memory. Everyday life abounds with similar experiences. You may have proposed an idea to a friend and had it rejected, but weeks later your friend excitedly proposed the same idea to you, as if it were entirely new.

In such real-life situations it can be hard to say what prompts an implicit memory to surface. Psychologists have, however, developed ways to "prime" implicit memories in the lab (Schacter, 1996). To illustrate, imagine you have volunteered for a memory experiment. First, you are shown a list of words for several seconds:

assassin, octopus, avocado, mystery, sheriff, climate

Then, an hour later, the experimenter asks you to examine another list and indicate which items you recognize from the earlier list: twilight, assassin, dinosaur, and mystery. That task is easy for you. But then the experimenter shows you some words with missing letters and asks you to fill in the blanks:

c h _ _ _ n k, o _ t _ _ u s, _ o g _ y _ _ _ , _ l _ m _ t e

It is likely that answers for two of these pop readily into mind, *octopus* and *climate.* But chances are that you will be less successful with the other two words, *chipmunk* and *bogeyman.* This difference is due to **priming**, the procedure of providing cues that stimulate memories without awareness. Because you had been primed with the words *octopus* and *climate,* they more easily "popped out" in your consciousness than did words that had not been primed.

RETRIEVING EXPLICIT MEMORIES WITH RECALL AND RECOGNITION Explicit memories can be cued in two primary ways. One involves the kinds of retrieval cues used on essay tests; the other involves cues found on multiple choice tests.

1. Essay tests require **recall** or retrieving a memory with minimal retrieval cues. That is, on an essay test, you must create an answer almost entirely from memory, with the help of only minimal cues from a question such as, "What are the two ways to cue explicit memories?"

2. **Recognition**, on another hand, is the method required by multiple-choice tests. In a recognition task, you merely identify whether a stimulus has been previously experienced. Normally, recognition is less demanding than recall because the cues are much more complete.

The police use recognition when they ask an eyewitness to identify a suspect in a lineup. The witness is required only to match an image from memory (the crime) against a present stimulus (a suspect in the lineup). And what would be a comparable recall task? A witness working with a police artist to make a drawing of a suspect must recall, entirely from memory, the suspect's facial characteristics.

Of course, recognizing a stimulus doesn't necessarily mean that it matches the current context. We run into this problem on multiple-choice exams when several options offer concepts we have learned, but only one of them is a match to the particular question. Similarly, suspects have been falsely identified in police lineups by eyewitnesses if, for example, police have shown the eyewitness books of mug shots that include one or more of the suspects in the lineup. In these cases, eyewitnesses can mistakenly identify a suspect because they recognize him from the mug shot book rather than the actual crime (Weiner and others, 2003). Thus, although recognition generally produces more memories than recall, it also is more likely to produce false positives—or, in this case, false memories. You can help yourself avoid this type of mistake on exams by using some of the tips in this chapter to more effectively study and remember what you are trying to learn.

5.5.2: Other Factors Affecting Retrieval

We have seen that the ability to retrieve information from explicit declarative memory depends on whether the information was encoded and elaborated to make it meaningful. You won't be surprised to learn that alertness, stress level, drugs, and general knowledge also affect retrieval. Less well known, however, are the following, which relate to the *context* in which you encoded a memory and also the context in which you are remembering.

ENCODING SPECIFICITY The more closely retrieval cues match the form in which the information was encoded, the better they will cue the appropriate memory. For example, perhaps you saw your psychology professor at the grocery store, but needed a moment to recognize who she or he was because the context didn't cue you to think "psychology professor." On the other hand, talking to a childhood friend may have cued a flood of memories you hadn't thought about for years. These two experiences illustrate the **encoding specificity principle**, which says successful recall depends on how well your retrieval cues match cues that were present when the memory was encoded.

So, one important thing you can do in studying for exams is to anticipate what retrieval cues are likely to be on the test and organize your learning around those probable cues. Students who merely read the material and hope for the best may have trouble. In fact, this is such a common problem that psychologist Robert Bjork (2000) has suggested teachers introduce "desirable difficulties" into their courses to encourage students to encode the material in multiple ways. What are desirable difficulties? Bjork argues that by giving students assignments that require them to interact with the material in many different ways—projects, papers, problems, and presentations—professors help students build a greater web of associations into which a memory is embedded—and the more connections there are, the easier it becomes to cue a memory. If your own professor doesn't do this, what can you do to create more associations with the concepts you are learning?

MOOD AND MEMORY Information processing isn't just about facts and events; it's also about emotions and moods. We use the expressions "feeling blue" and "looking at the world through rose-colored glasses" to acknowledge that moods bias our perceptions. Likewise, our moods can also affect what we remember, a phenomenon called **mood-congruent memory**. If you have ever had an episode of uncontrollable giggling, you know how a euphoric mood can trigger one silly thought after another. And at the other end of the mood spectrum, people with depression often report that all their thoughts have a melancholy aspect. In this way, depression can perpetuate itself through retrieval of depressing memories (Sakaki, 2007).

Not just a laboratory curiosity, mood-congruent memory can also have important health implications. Says memory researcher Gordon Bower, "Doctors assess what to do with you based on your complaints and how much you complain" (McCarthy, 1991). Because people with depression are likely to emphasize their medical symptoms, they may receive different treatment from that dispensed to more upbeat individuals with the same disease. This, says Bower, means physicians must learn to take a person's psychological state into consideration when deciding on a diagnosis and a course of therapy.

PROSPECTIVE MEMORY   One of the most common memory tasks involves remembering to perform some action at a future time—such as keeping a doctor's appointment, going to lunch with a friend, or setting out the garbage cans on the appointed day. Psychologists call this **prospective memory**. Failure in prospective memory—which accounts for more than half of everyday memory failures (Crovitz & Daniel, 1984)—can have consequences that range from merely inconvenient and embarrassing to horrific:

> After a change in his usual routine, an adoring father forgot to turn toward the day care center and instead drove his usual route to work at the university. Several hours later, his infant son, who had been quietly asleep in the back seat, was dead (Einstein & McDaniel, 2005, p. 286).

How could such a terrible thing happen? The father probably became distracted from his intended task and fell into his customary routine—as do parents of several children each year in similar circumstances. To avoid this type of memory failure, experts recommend creating a reminder cue and putting it somewhere you will definitely see—which for the father may have meant placing his briefcase in the backseat with his child.

Multitasking is a major cause of prospective memory failures (Dismukes, 2012). When we are juggling several tasks simultaneously, we seem to be able to manage it if the tasks don't require much conscious attention. When something happens that requires us to focus on one of the tasks, though, our attention shifts completely away from the others and we often forget where we were in the other tasks—or even forget about them completely. What are some examples of things you've forgotten in this type of situation?

Prospective memory impacts many aspects of our life, ranging from airline safety to health. In fact, as many as 1 in 5 airline accidents can be traced to this type of forgetting (Berman & Dismukes, 2006). Pilots, for example, must complete a carefully constructed set of procedures before takeoff and landing, but if the process is interrupted by a distraction, pilots may forget where they were in the process and omit an important step. Individuals taking daily medications experience the same problem when their morning (or evening) routines are interrupted—they may not remember if they've taken the medication or not, increasing their risk of heart attack or death (Nelson and others, 2006).

In light of the frequency of prospective memory failures, is there anything we can do to prevent them? What do you think?

Experts suggest following these steps to prevent prospective memory failures.

- Keep a "to-do" list for yourself, and use other concrete memory aids such as the calendar or reminder function on your cell phone.

- When carrying out important procedures (such as studying), don't multitask.
- When a task is crucial, don't put it off—do it right away to avoid forgetting about it.
- Use reminder cues, like the father in the above example might have done, to avoid forgetting something that is a departure from your routine.
- Finally, avoid taking frequent breaks. Studies have also shown that taking frequent breaks or switching tasks increases the chances of this type of forgetting (Finstad and others, 2006). So, stop checking your phone and social media feeds while you're studying!

Psychology Matters

On the Tip of Your Tongue

Answer as many of the following questions as you can:

- What is the North American equivalent of the reindeer?
- What do artists call the board on which they mix paints?
- What is the name for a tall, four-sided stone monument with a point at the top of its shaft?
- What instrument do navigators use to determine latitude by sighting on the stars?
- What is the name of a sheath used to contain a sword or dagger?
- What is the name of a small Chinese boat usually propelled with a single oar or pole?

If this demonstration works as expected, you couldn't remember all the answers, but you had a strong sense you had them somewhere in memory. You might say that the answer was "on the tip of your tongue." Appropriately enough, psychologists refer to this near-miss memory as the **TOT phenomenon** (Brown, 1991). Surveys show that most people have a "tip-of-the-tongue" (TOT) experience

The Washington Monument is an example of a tapered stone object that is topped by a pyramid-shaped point. Can you recall the name for such objects? Or is it "on the tip of your tongue"?

about once a week. Among those who watch *Jeopardy*, it may occur even more frequently. And, according to a recent study, deaf persons who use sign language sometimes have a "tip-of-the-fingers" (TOF) experience in which they are sure they know a word but cannot quite retrieve the sign (Thompson and others, 2005). Obviously, then, some fundamental memory process underlies both the TOT and the TOF phenomena.

The most common TOT experiences center on names of personal acquaintances, names of famous persons, and familiar objects (Brown, 1991). About half the time, target words finally do pop into mind, usually within about one agonizing minute (Brown & McNeill, 1966).

What accounts for the TOT phenomenon?

- One possibility—often exploited in laboratory studies—involves inadequate context cues. This is probably what made you stumble on some of the items above: We did not give you enough context to activate the schema associated with the correct answer.

- Another possibility involves *interference:* when another memory blocks access or retrieval, as when you were thinking of Jan when you unexpectedly meet Jill (Schacter, 1999). And, even though you were unable to recall some of the correct words in our demonstration of TOT (caribou, palette, obelisk, sextant, scabbard, sampan), you may have spotted the right answer in a recognition format. It's also likely that some features of the sought-for words abruptly popped to mind ("I know it begins with an *s!*"), even though the words themselves eluded you. So the TOT phenomenon occurs during a recall attempt when there is a weak match between retrieval cues and the encoding of the word in long-term memory.

And we'll bet you can't name all seven dwarfs.

Key Question: Why Does Memory Sometimes Fail Us, and What Can We Do About It?

Core Concept 5.4

Most of our memory problems arise from memory's "seven sins"—which are really by-products of otherwise adaptive features of human memory.

We forget appointments and anniversaries. During a test you can't remember the terms you studied the night before. Or a familiar name seems just out of your mental reach. Yet, ironically, we sometimes cannot rid memory of an unhappy event. Why does memory play these tricks on us—making us remember what we would rather forget and forget what we want to remember?

According to memory expert Daniel Schacter, the culprit is what he terms the "seven sins" of memory:

1. Transience
2. Absent-mindedness
3. Blocking
4. Misattribution
5. Suggestibility
6. Bias
7. Unwanted persistence (Schacter, 1999, 2001)

Further, he claims these seven problems are really consequences of some very useful features of human memory. From an evolutionary perspective, these features stood our ancestors in good stead, so they are preserved in our own memory systems. The core concept puts this notion more succinctly:

> Most of our memory problems arise from memory's "seven sins"—which are really by-products of otherwise adaptive features of human memory.

While examining the "seven sins," we will consider such everyday memory problems as forgetting where you left your keys or the inability to forget an unpleasant experience. We will also explore strategies for improving memory by overcoming some of Schacter's "seven sins"—with special emphasis on how certain memory techniques can improve your studying. In fact, you can start your learning of these "seven sins" by categorizing them into two types:

1. The first three we will discuss are *sins of omission*, which involve actual forgetting.
2. The remainder are *sins of commission*, which are memory distortions rather than memory lapses.

We begin with the frustration of fading memories.

By the end of this section, you will be able to:

5.6   **Summarize the three sins of omission**

5.7   **Explain the sins of commission**

5.8   **Describe ways that mnemonics help us in improving memory**

5.6: The Sins of Omission

Objective: **Summarize the three sins of omission**

How would you do on a rigorous test of the course work you took a year ago? Probably not very well, right? Let's examine how the three "sins of omission" may help explain your fading memories—and what you can do about it.

5.6.1: Transience: Fading Memories Cause Forgetting

In a classic study of **transience**, pioneering psychologist Hermann Ebbinghaus (1908/1973) first learned lists of *nonsense syllables* (such as POV, KEB, FIC, and RUZ) and tried to recall them over varying time intervals. This worked well over short periods, up to a few days. But to measure memory after long delays of weeks or months, when recall had failed completely, Ebbinghaus had to invent another method: He measured the number of trials required to relearn the original list. Because it generally took fewer trials to relearn a list than to learn it originally, the difference indicated a "savings" that could serve as a measure of memory. (If the original learning required 10 trials and relearning required 7 trials, the savings was 30%.) By using the *savings method*, Ebbinghaus could trace memory over long periods of time. The curve obtained from combining data from many experiments appears in Figure 5.11 and represents one of Ebbinghaus's most important discoveries: *For relatively meaningless material, we have a rapid initial loss of memory followed by a declining rate of loss* Subsequent research shows that this **forgetting curve** captures the pattern of transience by which we forget much of the verbal material we learn.

Figure 5.11 Ebbinghaus's Forgetting Curve

Ebbinghaus's forgetting curve shows that the savings demonstrated by relearning drops rapidly and reaches a plateau, below which little more is forgotten.
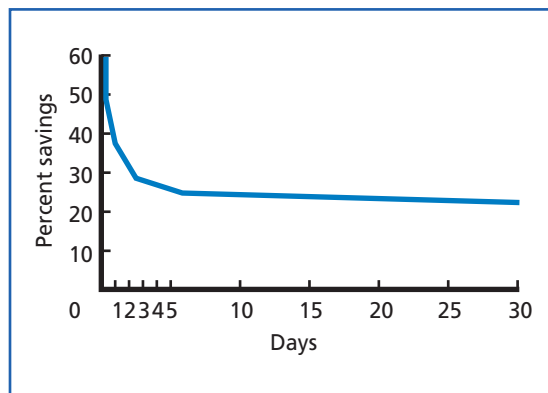
Modern psychologists have built on Ebbinghaus's work, but with more emphasis on how we remember *meaningful* material, such as information you read in this book. Meaningful memories don't fade as quickly as Ebbinghaus's nonsense syllabus—which is yet another reason you should use **elaborative rehearsal** to make concepts meaningful when you study them. You can also apply Ebbinghaus's work by noting that studying material repeatedly (or, relearning) helps bolster memory and prevent fading.

Not all memories, however, follow the classic forgetting curve. We often retain well-used motor skills, for example, substantially intact in procedural memory for many years, even without practice—"just like riding a bicycle." Memory for foreign languages learned, but not used for a long period of time, also seems to remain relatively intact (subject to less forgetting than Ebbinghaus predicted) for as long as 50 years (Bahrick, 1984). Similarly, recognition of high-school classmates' names and faces remains about 90% accurate even up to 45 years (although recall-based memory tasks show much lower retention; Bahrick and others, 1975). What accounts for less **transience** in these areas? We'll reveal the answer to that question at the end of this section in our discussion of study tips.

THE BIOLOGICAL BASIS OF FORGETTING   Brain scientists recently discovered one major cause of fading memories, and it's likely to surprise you: *The very act of remembering can cause forgetting!* No, you didn't read that wrong—memory researchers in the UK were able to actually observe the process as it occurred using MRI scans. Here's how: They first taught participants a set of word–image pairs, then used the words as cues for the participants to retrieve the image associated with each word. Each time an image was retrieved, the memory of that image became more vivid—a pattern that was evident by the neural firings associated with that memory. At the same time, though, the other images participants had learned became less vivid, demonstrating that each time we retrieve a particular memory, the process of doing so actively suppresses competing memories (Wimber and others, 2015).

These findings have important implications in a variety of settings. In police investigations and eyewitness testimony for trials, witnesses are often quizzed repeatedly about the details of the event. This process, we now know, will strengthen the memories they are asked about, but suppress other, related details of the event that may be equally important. Thus, their memories may become skewed over time as the result of the repeated access of certain details, potentially contributing to flawed verdicts. The new study also helps us understand selective memory, and even self-deception.

Perhaps the sadly notorious case of NBC News anchor Brian Williams's inaccurate accounts of the peril he faced on a helicopter shot down in Iraq (when in truth he was riding in the helicopter behind the one that was shot down) may be better understood by the revealing findings of Wimber's study.

Have you ever known anyone to slightly exaggerate a story in the initial telling of it, and then—after repeated retellings—truly seem to believe the inflated account?

Perhaps even you have done so—without realizing it. Consider your memories about that instance.

INTERFERENCE Another cause of transience comes from **interference**—when one item prevents us from forming a robust memory for another item. This often occurs when you attempt to learn two conflicting things in succession, such as if you had a French class followed by a Spanish class.

What causes interference? Three main factors top the list:

1. **The more similar the two sets of material to be learned, the greater the likelihood of interference.** So French and Spanish classes are more likely to interfere with each other than are, say, psychology and accounting.

2. **Meaningless material is more vulnerable to interference than meaningful material.** Because LTM is organized by meaning, you will have more trouble remembering two different passwords than you will two news stories. You can, however, use this same information to better remember the passwords—by making them meaningful.

3. **Emotional material can be an especially powerful cause of interference.** So if you broke up with your true love last night, you may forget what your literature professor says in class today.

There are two types of interference.

1. **Proactive interference** occurs when an old memory disrupts the learning and remembering of new information. So, for example, we encounter proactive interference every January when we have trouble remembering to write the correct year on assignments for school. It happens, too, when we switch from one computer program or app to a similar new one but keep trying to do things "the old way," or if you find yourself walking toward last semester's classrooms when a new term begins. It is also to blame if you've ever accidentally called your significant other by the name of your ex instead! *Pro-* means "forward," so in proactive interference, old memories act forward in time to block your attempts at new learning.

2. When the opposite happens—when new information prevents your remembering older information—we can blame forgetting on **retroactive interference**. *Retro-* means "backward, so the newer material reaches back into your memory to push old material out of memory (see Figure 5.12).

In a computer, retroactive interference occurs when you save a new document in place of an old one. Much the same thing happens in your own memory when new information you are learning in this chapter gets

Figure 5.12 Two Types of Interference

Study Spanish

papel
libro pluma
perro

Study French

papier
livre plume
chien

Recall French

French 101
Midterm exam

papier_____
livre_____
plume_____
chien_____

proactive interference

Study Spanish

papel
libro pluma
perro

Study French

papier
livre plume
chien

Recall Spanish

Spanish 101
Midterm exam

papel_____
libro_____
pluma_____
perro_____

retroactive interference
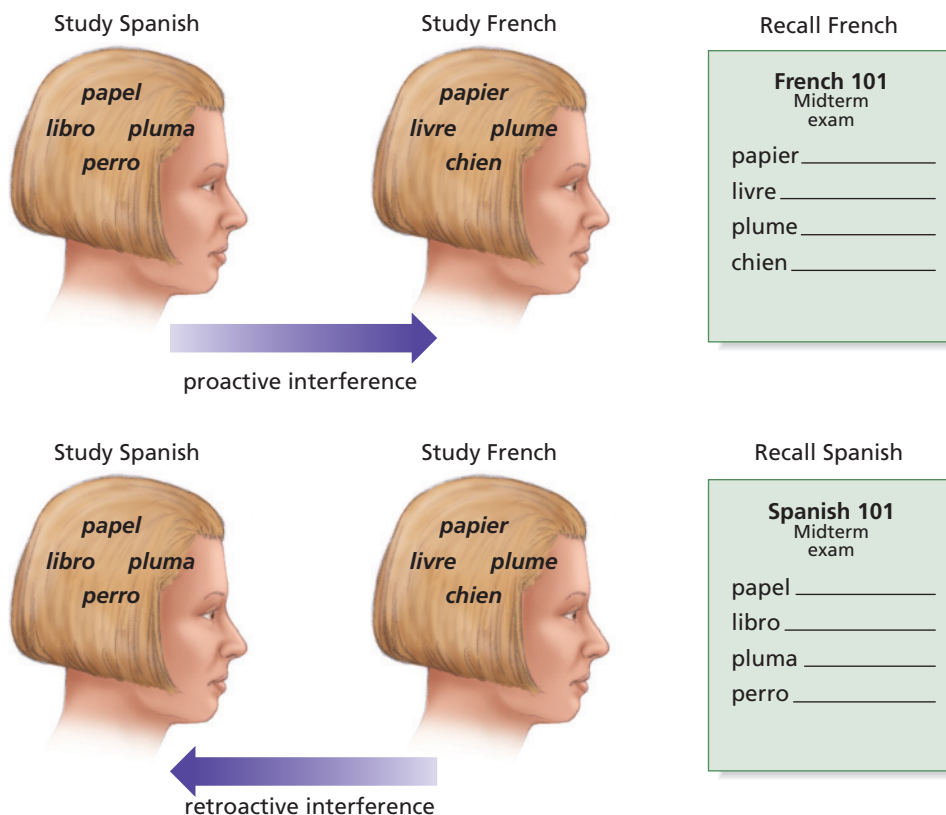
in the way of you remembering material from previous chapters, or when you meet two new people in succession, and the second name causes you to forget the first one.

The Serial Position Effect   Have you ever noticed that the first and last parts of a poem or vocabulary list are usually easier to learn and remember than the middle portion? In general, the *primacy effect* refers to the relative ease of remembering the first items in a series, while the *recency effect* refers to the strength of memory for the most recent items. Together, with diminished memory for the middle portion, we term this the **serial position effect**. So when you are introduced to several people in succession, you are more likely to remember the names of those you met first and last than those you met in between. (That's assuming other factors are equal, such as the commonness of their names, distinctiveness of their appearance, and their personalities.)

How does interference theory explain the serial position effect? Unlike the material at the ends of the poem or list, the part in the middle is exposed to a double dose of interference—both retroactively and proactively. That is, the middle receives interference from both directions, while material at either end gets interference from only one side. So, in view of the serial position effect, perhaps it would be helpful to pay special attention to the material in the middle of this chapter.

5.6.2: Absent-Mindedness: Lapses of Attention Cause Forgetting

When you misplace your car keys or forget an anniversary, you have had an episode of **absent-mindedness**, the second "sin" of memory. It's not that the memory has disappeared from your brain circuits. Rather, you have suffered a retrieval failure caused by shifting your attention elsewhere. In the case of a forgotten anniversary, the attention problem occurred on the retrieval end—when you were concentrating on something that took your attention away from the upcoming anniversary. As for the car keys, your attentive shift probably occurred during the original

encoding—when you weren't paying attention to where you laid them. This form of absent-mindedness often comes from listening to music, watching TV, or checking your social media feeds while studying. See for yourself by trying the experiment in Figure 5.13.

This kind of encoding error was also at work in **depth of processing** experiments: People who encoded information shallowly ("Does the word contain an *e?*") were less able to recall the target word than those who encoded it deeply ("Is it an animal?"). Yet another example can be found in demonstrations of **change blindness**: In one study, participants viewed a movie clip in which one actor who was asking directions was replaced by another actor while they were briefly hidden by two men carrying a door in front of them. Amazingly, fewer than half the viewers noticed the change (Simons & Levin, 1998).

Figure 5.13 The "Magic of Memory"

(A) Pick one of the cards. Stare at your chosen card intently for at least 15 seconds, being careful not to shift your gaze to the other cards.
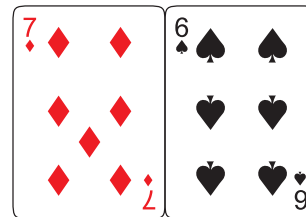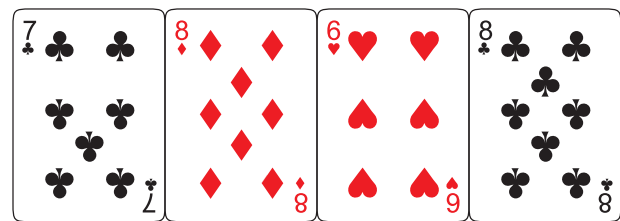
(B) Your card is gone! How did we do it? We didn't read your mind; it was your own reconstructive memory and the "sin" of absent-mindedness playing card tricks on you. If you don't immediately see how the trick works, try it again with a different card
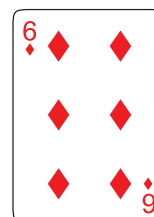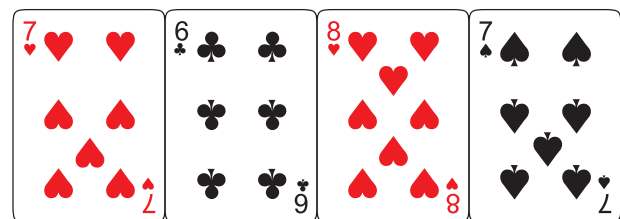
When Are You Absentminded?

Did you fall victim to the "sin" of absentmindedness in the previous activity? In what situations are you most likely to forget something due to absentmindedness? What can you do to overcome it?

▶ `The response entered here will appear in the performance dashboard and can be viewed by your instructor.`

Submit

5.6.3: Blocking: Access Problems

Blocking, the third "sin" of memory, occurs when we lose access to information, such as when you see familiar people in new surroundings and can't remember their names. The most thoroughly studied form of blocking, however, involves the maddening TOT experience: when you *know you know* the name for something but can't retrieve it. As we saw earlier, the TOT phenomenon often results from poor **context cues** that fail to activate the necessary memory schema.

Stress, too, can produce blocking, perhaps through failure to sustain one's focus of attention. Similarly, distraction can cause blocking on prospective memory tasks, such as remembering to perform a certain action at a certain time. Age plays a role, too, with blocking increasing as one grows older.

5.7: The Sins of Commission

Objective: **Explain the sins of commission**

All three "sins" discussed so far are sins of omission that make memories unavailable in one way or another. Now let's turn our attention to the sins of commission, which are a more active form of memory failure.

5.7.1: Misattribution: Memories in the Wrong Context

Sometimes we retrieve memories but associate them with the wrong time, place, or person. Schacter (1999) calls this **misattribution**, a problem that stems from the reconstructive nature of long-term memory. Here's a powerful example: Psychologist Donald Thomson was accused of rape based on a victim's detailed, description of her assailant (PsychBlog, 2008). Thomson, however, had an indisputable alibi: When the crime occurred, he was being interviewed on live television—about memory distortions! The victim,

it turned out, had been watching the interview just prior to the rape and, in the stress of the experience, recalled Thomson's face instead of the face of her assailant—a classic case of misattribution.

Not all examples of misattribution are so dramatic—in fact, most of us probably make this type of memory error almost every day, thinking we learned something in class when we actually read it online, for example, or thinking one person told us something when we actually heard it from someone else. Misattribution can also prompt people to mistakenly believe that other people's ideas are their own, leading to unintentional plagiarism. Studies, in fact, suggest that this happens up to 9% of the time, when we unintentionally take credit for someone else's ideas, thinking they are truly our own (Preston & Wegner, 2007).

Yet another type of misattribution can cause people to remember something they did not experience at all. Such was the case with volunteers who were asked to remember a set of words associated with a particular theme: *door, glass, pane, shade, ledge, sill, house, open, curtain, frame, view, breeze, sash, screen,* and *shutter.* Under these conditions, many later remembered *window,* even though that word was not on the list (Roediger & McDermott, 1995, 2000). This result again shows the power of context cues and schemas in determining the content of memory. And it demonstrates yet again how people tend to create and retrieve memories based on meaning.

5.7.2: Suggestibility: External Cues Distort or Create Memories

Memories can also be distorted, or even created, by the power of suggestion—a finding of particular concern to the courts. Attorneys or law enforcement officers interviewing witnesses may make suggestions about the facts of a case—either deliberately or unintentionally—that could alter a witness's memory. Consider this case:

WATCH Jennifer Thompson's Eyewitness Account

When Jennifer Thompson was raped, she had the presence of mind to focus on the physical characteristics of the man who assaulted her so she could provide a detailed and accurate account if she survived. You can view the video here: https://youtube/DZsckuKiH94

Was Jennifer Thompson's recollection correct? Before telling you more about this story, let's look at what external cues can impact memory. Memory researchers Elizabeth Loftus and John Palmer conducted a series of studies to find out if eyewitness memories could be distorted by **suggestibility**.

Figure 5.14 Effects of Suggestion on Memory

In questioning participants in a study of eyewitness memory, researchers varied the wording of the questions to "suggest" different speeds of a car. Words that implied faster speeds results in higher estimates of speed from participants.

Question	Verb	Estimated miles per hour
About how fast were the cars going when they _____ each other?	smashed	40.8
	hit	34.0
	contacted	30.8
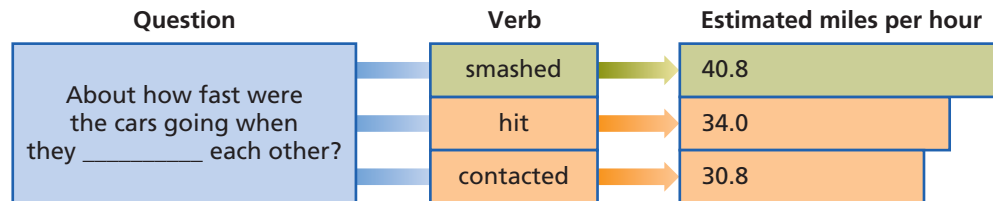
MEMORY DISTORTION Participants in the classic Loftus and Palmer study first watched a film of two cars colliding. Then the experimenters asked them to estimate how fast the cars had been moving (Loftus, 1979, 1984; Loftus & Palmer, 1973). Half the witnesses were asked, "How fast were the cars going when they *smashed* into each other?" The other half were instead asked, "How fast were the cars going when they *hit* each other?" The first group, subtly influenced by the word "smashed," estimated the cars were traveling about 25% faster than the estimates provided by the second group (see Figure 5.14). This distortion of memory caused by misinformation has been dubbed, appropriately, the **misinformation effect**. This distortion can also arise from a different type of suggestion. In a related experiment, some witnesses were asked how fast a car was going when it passed a barn, while others were asked if they saw a barn in the video. Later, when asked if there had been a barn in the film, participants in the first group were much more like to remember seeing one (when, in fact, there was none). This type of memory distortion, and the processes that cause it, clearly pose important hazards to investigators. These early studies led to additional research examining how memories can actually be *created* by similar methods.

FABRICATED MEMORIES The famed developmental psychologist Jean Piaget (1962) described a vivid memory of a traumatic event from his own early childhood:

> One of my first memories would date, if it were true, from my second year. I can still see, most clearly, the following scene in which I believed until I was about fifteen. I was sitting in my pram, which my nurse was pushing in the Champs Elysées [in Paris], when a man tried to kidnap me. I was held in by the strap fastened round me while my nurse bravely tried to stand between me and the thief. She received various scratches, and I can still see vaguely those on her face . . . (pp. 187–188).

Piaget's nurse described the alleged attack in vivid detail and was given an expensive watch from his parents as a token of thanks for her bravery. However, years later, the former nurse sent a letter to Piaget's family confessing the story had been fabricated and returning the watch. From this, Piaget (1962) concluded:

> I, therefore, must have heard, as a child, the account of this story, which my parents believed, and projected into the past in the form of a visual memory (Piaget, 1962, p. 188).

Are we all susceptible to creating false memories such as the one Piaget described? What do you think?

To find out, Elizabeth Loftus and her colleagues conducted a new set of experiments. They first contacted parents of a group of college students, obtaining lists of childhood events the students had been exposed to. Next, they showed the lists to the students, who were asked if they remembered the various events. Unbeknownst to the students, however, researchers had embedded events in those lists that were plausible, but had never happened—such as being lost in a shopping mall, spilling the punch bowl at a wedding, meeting Bugs Bunny at Disneyland (impossible because Bugs is not a Disney character), or experiencing a visit by a clown at a birthday party (Loftus, 2003a). After repeated recall attempts over a period of several days, about one-fourth of the students claimed to remember the bogus events. All that was required were some credible suggestions. (This experiment may remind you of Donna's case, with which we began our chapter: Repeated suggestions by the therapist led to Donna's fabricated memory.)

New research suggests that doctored photographs can also create false memories, perhaps even more powerfully than the stories used by Loftus and her colleagues. For example, in a variation of the lost-in-the-mall technique, adults viewed altered photographs purporting to show them riding in a hot air balloon. After seeing the photos several times over a period of 2 weeks, half the participants "remembered" details about the fictitious balloon ride (Wade and others, 2002). Even in this age of digital cameras and image-altering software, people don't always stop to question whether a photograph may have been modified (Garry & Gerrie, 2005).

FACTORS AFFECTING THE ACCURACY OF EYEWITNESSES To what extent, then, can we rely on eyewitness testimony? Obviously, it is possible in laboratory

experiments to distinguish false memories from true ones. But what about real-life situations? For example, did Jennifer Thompson, whom we met briefly in the video above, correctly identify the man who assaulted her?

WATCH How Accurate Are Eyewitness Accounts?

Watch Jennifer Thompson recount how she identified the man she thought had assulted her at https://youtu.be/DZsckuKiH94. What do we know about memory that may have contributed to the accuracy and confidence of her testimony?

Jennifer Thompson's case, like hundreds of others, resulting in a wrongful conviction based on erroneous—yet supremely confident—eyewitness testimony. In fact, eyewitness misidentification is a leading cause of wrongful conviction, accounting for more than 75% of wrongful convictions later overturned due to DNA evidence.

What about cases in which people claim to have recovered memories of long-forgotten events? As we saw in our second case at the beginning of the chapter, Ross's recollection was independently verified by the confession of a camp counselor, but such objective evidence doesn't always materialize. In such cases, the best we can do is look for evidence of suggestion that may have produced the memory—as we see in false-memory experiments. If suggestion has occurred, a healthy dose of skepticism is warranted, unless objective evidence appears. Specifically, we should beware of eyewitness reports tainted by the following factors (Kassin, 2001):

- *Leading questions* ("How fast were the cars going when they *smashed* into each other?") can influence witnesses' recollections. But, if witnesses are forewarned that interrogations can create memory bias, leading questions have less effect.
- *The passage of substantial amounts of time,* which allows the original memory to fade, makes people more likely to misremember information.
- *Repeated retrieval:* Each time a memory is retrieved, it is reconstructed and then restored (much like a computer document that is retrieved, modified, and saved), increasing the chances of error.
- *The age of the witness:* Younger children and older adults may be especially susceptible to influence by misinformation.
- *Unwarranted confidence:* Confidence in a memory is not a sign of an accurate memory. In fact, misinformed individuals can actually come to believe the misinformation in which they feel confident.

Based on such concerns, the U.S. Department of Justice has published national guidelines for gathering eyewitness testimony.

WATCH The Innocence Project

Watch the video: https://www.youtube.com/watch?v=DZsckuKiH94&feature=youtu.be to learn how Jennifer Thompson and Ronald Cotton advocate for science-based practices in eyewitness testimony and police procedure. Double-blind administration of lineups is a crucial step in fair procedures.

5.7.3: Bias: Beliefs, Attitudes, and Opinions Distort Memories

The sixth memory "sin," which Schacter calls *bias,* refers to the influence of personal beliefs, attitudes, and experiences on memory. Lots of domestic arguments of the "Did not! Did too!" variety owe their spirited exchanges to bias. While it's easier to see another person's biases than our own, here are two common forms you should especially guard against.

EXPECTANCY BIAS An unconscious tendency to remember events as being congruent with our expectations produces **expectancy bias**. To illustrate, suppose you are among a group of volunteers for an experiment in which you read a story about the relationship between Bob and Margie, a couple who plan to get married. Part of the story reveals that Bob doesn't want children, and he is worried about how Margie will react to that. When he does tell her, Margie is shocked, because she desperately wants children. To your surprise, you are informed after reading the story that, contrary to your expectations, Bob and Margie did get married. Meanwhile, another group of volunteers reads the same story but are told the couple ended their relationship. Other than the ending, will people in those two groups remember the Bob and Margie story differently?

In a laboratory experiment using this same story, those who heard the unexpected ending (the condition in which Bob and Margie decided to get married) gave the most erroneous reports. Why? Because of their expectancy biases, they recalled distorted information that made the outcome fit their initial expectations (Schacter, 1999; Spiro, 1980). One person, for example, "remembered" that Bob and Margie had separated but decided their love could overcome their differences. Another related that the couple had decided on adoption as a compromise. When something happens that violates our expectations, then, we may unconsciously skew the information so it better fits our preexisting notions.

SELF-CONSISTENCY BIAS People abhor the thought of being inconsistent, even though research suggests that they are kidding themselves. This Schacter calls the **self-consistency bias**. For example, studies have found people to be far less consistent than they realized in their

support for political candidates, as well as on political issues such as the equality of women, aid to minority groups, and the legalization of marijuana (Levine, 1997; Marcus, 1986).

Of particular interest for the study of memory, self-consistency bias can affect the content of our memories (Levine & Safer, 2002). One study interviewed dating couples twice, 2 months apart, and found memories about the relationship changed based on how well the relationship had progressed over the 2-month interval. Importantly, though, participants generally did not recognize their inconsistencies. Those whose relationships had improved remembered their initial evaluations of their partners as more positive than they actually were, while those whose relationships had declined had the opposite response (Scharfe & Bartholomew, 1998). In this study, as well as many others involving attitudes, beliefs, opinions, or emotions, we see that our biases act as a sort of distorted mirror in which our memories are reflected—but without our awareness that our memories had been altered.

Table 5.2 The "Seven Sins" of Memory

Sin	Description	Example
Transience	Decreasing accessibility of memory over time	Simple forgetting of long-past events
Absent-mindedness	Lapses of attention that result in forgetting	Forgetting location of car keys
Blocking	Information is present but temporarily accessible	Tip-of-the-tongue
Misattribution	Memories are attributed to an incorrect source	Confusing a dream for a memory
Suggestibility	Implanted memories about things that never occurred	Leading questions produce false memories
Bias	Current knowledge and beliefs distort our memories of the past	Recalling past attitudes in line with current attitudes
Persistence	Unwanted recollections that we can never forget	Traumatic war memories

5.7.4: Persistence: When We Can't Forget

The seventh "sin" of memory, **persistence**, reminds us that memory sometimes works all too well. We all experience this occasionally, when a persistent thought, image, or melody cycles over and over in our minds. Thankfully, for most of us, such intrusive memories are usually short-lived. They can become a problem, though, when accompanied by intense negative emotions. At the extreme, the persistence of memories for unpleasant events creates a downward emotional spiral whereby people suffering from depression can't stop ruminating about unhappy events or traumas in their lives. Similarly,

patients with phobias may become obsessed by fearful memories about snakes, dogs, crowds, spiders, or lightning. And individuals with **posttraumatic stress disorder** may not be able to suppress memories of their traumatic experience.

Researchers suggest that an important biological process called inhibitory control is at work in this puzzle of persistence. Just like we suppress our instinct to catch a falling object when we notice that object is a sharp knife, under normal conditions humans can suppress troubling memories when they threaten harm to our well-being. In people struggling with PTSD, however, this type of inhibitory control is compromised, leading to the persistent intrusion of the traumatic memories. Neuroscientists have traced the biological roots of the problem to some type of miscommunication or faulty functioning between the **prefrontal cortex** and the **hippocampus**. As you may recall, the prefrontal cortex is our brain's executive, helping with planning, rational thinking, and problem solving. Brain imaging studies indicate that, in people with PTSD, the prefrontal cortex is less able to wield its executive power to stop the hippocampus from retrieving the malignant memories (Catarino and others, 2015).

5.7.5: The Advantages of the "Seven Sins" of Memory

Despite the grief they cause us, the "seven sins" arise from adaptive features of memory, argues Daniel Schacter (1999).

1. Thus, **transience**—maddening as it is to the student taking a test—actually prevents the memory system from being overwhelmed by information it no longer needs.

2. Similarly, **blocking** is useful when it allows only the most relevant information—information most strongly associated with present cues—to come to mind. These processes, then, help protect us from a flood of unwanted and distracting memories.

3. **Absent-mindedness**, too, is the by-product of the useful ability to shift our attention.

4. Similarly, **misattributions**, *biases*, and **suggestibility** result from a memory system built to focus on *meaning* and discard details: The alternative would be a computer-like memory filled with information at the expense of understanding.

5. And, finally, we can see that the "sin" of **persistence** is really a feature of a memory system responsive to emotional experiences, particularly those involving dangerous situations. In general, then, the picture that emerges of memory's "failures" is also a picture of a system well adapted to conditions people have faced for thousands of years.

5.8: Improving Your Memory with Mnemonics

Objective: **Describe ways that mnemonics help us in improving memory**

One way to improve your memory is to develop a tool kit of mental strategies known as mnemonics (pronounced *ni-MON-ix,* from the Greek word meaning "remember"). **Mnemonic strategies** help you encode new information by associating it with information already in long-term memory. To illustrate, we will take a detailed look at two mnemonic strategies, the method of loci and natural language mediators, both of which are especially useful for remembering lists. Then we will offer tips to help with the common problem of remembering names.

5.8.1: The Method of Loci

Dating back to the ancient Greeks, the **method of loci** (pronounced *LOW-sye,* from *locus* or "place"), is literally one of the oldest tricks in this book. Greek orators originally devised the method of loci to help remember the major points of their speeches.

To illustrate, imagine a familiar sequence of places, such the major landmarks you pass on your way from home to school. Then, using the method of loci, mentally move from place to place on the route, and as you go imagine putting one item from your list in each place. To retrieve the series, you merely take another mental tour, examining the places you used earlier. There you will "see" the item you put in each place. To remember a grocery list, for example, you might mentally picture a can of tuna on your house, shampoo spilled on the skating rink you pass on your way to school, and a broken eggs on the fast food place. Bizarre or unconventional image combinations are usually easier to remember—so a can of tuna on your house will make a more memorable image than tuna on the grocery store (Bower, 1972). Clearly, this method relies heavily on vivid imagery—the better your visualization skills, the better you'll be able to remember the list. You'll also have to rehearse it repeatedly—so, in the case of a grocery list, you're probably better off just writing it down. World record holders in memory competitions, however, utilize this strategy often and with great success in memorizing long lists of names, numbers, and cards. Essentially, it's a way to add meaning to something otherwise meaningless, thus improving your ability to remember it.

5.8.2: Natural Language Mediators

Memory aids called **natural language mediators (NLM)** help us remember new information by associating it with meaningful word patterns such as a story, an acronym, a rhyme, or a song.

- Using this method to remember a grocery list, you would make up a story.
- Using the same list as before (tuna, shampoo, and eggs), the story might link the items this way: "The cat discovers I'm out of tuna so she interrupts me while I'm using the shampoo and meows to egg me on." (OK, we know it's hokey—but it works!)
- Similarly, advertisers know that rhyming slogans and rhythmic musical jingles make it easier for customers to remember their products and brand names (you may even have one stuck in your head now!).
- The chances are that a teacher in your past used a simple rhyme to help you remember a spelling rule ("*I* before *E* except after *C*") or the number of days in each month ("Thirty days has September . . .").
- In a physics class, you may have used a natural language mediator in the form of an *acronym*—a word made up of initials—to learn the colors of the visible spectrum in their correct order: "Roy G. Biv" for red, orange, yellow, green, blue, indigo, violet.

5.8.3: Remembering Names

The inability to remember people's names is one of the most common complaints about memory. So how could you use the power of association to remember names? In the first place, know that remembering names doesn't happen automatically. People who do it well work at it by making deliberate associations between a name and some characteristic of the person—the more unusual the association, the better.

Suppose, for example, you have just met us, the authors of this text, at a psychological convention. You might visualize Bob's face framed in a big *O,* taken from the middle of his name. To remember Vivian, think of her as "Vivacious Vivian," the liveliest person at the convention. And, as for Phil, you might visualize putting a hose in Phil's mouth and "fill"-ing him with water. (While unusual associations may be easier to remember than mundane ones, it is best not to tell people about the mnemonic you have devised to remember their names.)

In general, use of mnemonics teaches us that memory is flexible, personal, and creative. It also teaches us that *memory ultimately works by meaningful associations.* With this knowledge and a little experimentation, you can devise techniques for encoding and retrieval that work well for you, based on your own personal associations and, perhaps, on your own sense of humor.

Psychology Matters

Using Psychology to Learn Psychology

Mnemonic strategies designed for learning names or memorizing lists of unrelated items won't help much with the material you need to learn in your psychology class. There, the important material consists of concepts—often abstract concepts, such as "**operant conditioning**" or "**retroactive interference**"—ideas you need to *understand* rather than merely memorize. Such material calls for strategies geared both to concept learning and to avoiding the two memory "sins" feared most by college students, **transience** and **blocking**. Let's see what advice cognitive psychologists have for students trying to avoid these two quirks of memory.

Studying to Avoid Transience

- *Make the material personally meaningful.* Many studies have shown the power of **elaborative rehearsal**—the notion that memories remain stronger when they are meaningful, rather than just a collection of facts and definitions (Baddeley, 1998; Haberlandt, 1999). So, if you actively think of personal examples of new concepts, or connections between them, you will create a stronger set of retrieval cues for the material. You can also use the **whole method**, a technique often used by actors who must learn a script in a short time. With this approach, begin by getting an overview of all the material—the "big picture" into which details can be assimilated. Suppose, for example, you have a test on this chapter next week. Using the whole method, you would read through the chapter outline and summary, along with all headings and sub-headings, before beginning to read the details of the chapter. You would also frequently refer to the table of contents in the left margin of your screen to remind yourself how the concept you are currently studying fits into the larger context of the section or chapter you are reading. This approach erects a mental framework on which you can hang the details of encoding, interference, retrieval, and other memory topics.

- *Spread your learning out over time.* Next, use **distributed learning** to resist transience. In other words, study your psychology repeatedly and at frequent intervals rather than trying to learn it all at once in a single "cram" session (called *massed learning*). Distributed learning not only avoids the lowered efficiency of massed learning, which causes fatigue, but also strengthens memories in the process of consolidation. And, each time you study, review what you've already learned, harnessing the power of *repeated exposure* to help solidify your memories. One study found that students who studied in two separate sessions, rather than just one, learned twice as much in a given amount of time and also better understood the material (Bahrick and others, 1993). Distributed learning also results in longer retention of material (Schmidt & Bjork, 1992). And it helps us understand why we have enhanced memory capabilities for names and faces of high school friends even decades later: We likely accessed that information frequently while in high school—the equivalent of distributed learning.

- *Take active steps to minimize interference.* You can't avoid interference altogether, but you can avoid studying for another class after your review session for tomorrow's psychology test. You can also identify concepts or terms similar to each other, which you may be more likely to get mixed up, and spend extra time on them distinguishing the differences.

Studying to Avoid Blocking on the Test

The strategies above will help you get to the test with a strong memory for what you need to know. To really do well on the test, though, you must also avoid blocking, the inability to retrieve what you have in memory. To help you achieve this, we suggest some techniques that apply two more ideas you learned in this chapter, **elaborative rehearsal** and **encoding specificity**:

- *Review the material.* Students often think that, just because they read the material once and understood it, they will remember it. With complex concepts and ideas, though, you need to review what you have learned several times. And your review should not be mindless and passive—merely looking at the words in the book. Instead, you need to actively review, which you can do by using headings, sub-headings, and key terms to quiz yourself to determine how much of the material you accurately remember. Part of success on an exam is how quickly you can access the material you need—so remember that your speed of recall will increase every time you access the memory during study time. Also, start at different points in the material each time you study, so you can utilize the **serial position effect** to enhance your memory.

- *Test yourself with the retrieval cues you expect to see on the examination.* By using the principle of encoding specificity, you can learn the material in ways most likely to be cued by the questions on the test. This is often easier to do with a friend studying for the same test, ideally a few days before the exam, but after you have already prepared and feel ready. Your purpose, at this point, will not be to learn new material but to practice what you've learned as you anticipate the most likely test items. Does your professor prefer essay questions? Short-answer questions? Multiple choice? Try to think of and answer questions of the type most likely to appear on the test.

All these study strategies are based on well-established principles of learning and memory. Studying this way may sound like a lot of work—and it is. But the results will be worth the mental effort.

Critical Thinking Applied: The Recovered Memory Controversy

Let's return now to the case studies with which we began the chapter. Both involved claims of recovered memories: Ross's memory of molestation by a camp counselor was clearly accurate, and Donna's memory of abuse by her father was eventually repudiated. So where does that leave us when we hear about other such claims?

What Are the Critical Issues?

The controversy centers on the accuracy of claims of recovered memories—*not* on the reality of sexual abuse. Is it possible that recovered memories could be false? If so, we must decide how to judge their accuracy, especially memories of traumatic events.

Is the Claim Reasonable or Extreme?

Let's begin by asking: Is the notion of recovered memories of sexual abuse reasonable or outrageous? That is, does it fit with what we know both about memory and about sexual abuse? Let's see what the evidence can tell us.

We need to emphasize that sexual abuse of children *does* occur and poses a serious problem. How widespread is it? While estimates vary considerably, it appears that 4% to 20% of children in the United States have experienced at least one incident of sexual abuse (McAnulty & Burnette, 2004; Terry & Tallon, 2004). Accurate figures are difficult to obtain, of course, because people can be reluctant to discuss these experiences. And *if* it is true that sexual abuse can be blocked out of consciousness for long periods, the actual numbers could be higher.

We should also note that most claims of sexual abuse do *not* involve "recovered" memories. In general, we have no reason to doubt people who say they have been molested and have always remembered. The controversy centers on the relatively small percentage of memories said to have been "recovered" after having been forgotten for months or even years.

What Is the Evidence?

The general public harbors a strong but unfounded belief that the most common response to trauma is **repression**, as first described by Sigmund Freud. But, in fact, most people who have traumatic experiences remember them vividly, rather than forgetting them (McNally and others, 2003). Unwelcome remembering of disturbing experiences is precisely the problem in posttraumatic stress disorder (PTSD). How, then, can we account for the fact that a portion of cases in almost every research study in this area includes some reports of repression (Greenhoot and others, 2008)?

Until recently, psychologists were at a loss to answer this question. But now, University of California psychologist Gail Goodman and her colleagues (2010) may have found the answer. A series of studies has revealed striking evidence that children with an **avoidant attachment style**—or a general lack of trust in their environment and the principal people in it—are less likely to mentally process an abusive event when it occurs, resulting in less likelihood of a memory being encoded and stored in long-term memory. For these individuals, the end result may indeed be what has historically been termed "repression."

Could Bias Contaminate the Conclusion?

We have seen that memory does not make a complete record of our experiences. Nor is it always accurate. Of special relevance to the recovered memory controversy is research we discussed earlier in the chapter, showing that memories can rather easily be modified or even created by suggestion. As a result, participants not only report false memories but begin to believe them (Bruck & Ceci, 2004). Such experiments should make us skeptical of memories recovered during therapy or interrogation involving suggestive techniques. Memory expert Elizabeth Loftus argues that therapists who assume that most mental problems stem from childhood sexual abuse commonly use suggestive practices, although she does not say how widespread the problem might be (Loftus, 2003a, 2003b). And in the book *Making Monsters*, social psychologist Richard Ofshe and his coauthor describe how clients can unknowingly tailor their recollections to fit their therapists' expectations. He adds that "therapists often encourage patients to redefine their life histories based on the new pseudomemories and, by doing so, redefine their most basic understanding of their families and themselves" (Ofshe & Watters, 1994, p. 6).

We are *not* saying that all, or even most, therapists use suggestive techniques to probe for memories of sexual abuse, although some certainly do (Poole and others, 1995). Nevertheless, patients should be wary of therapists who go "fishing" for repressed memories of early sexual experiences using such techniques as hypnosis, dream analysis, and suggestive questioning. No evidence exists in support of these methods for the recovery of accurate memories.

Another source of suggestion that pops up in a surprisingly large proportion of recovered memory cases is a book: *The Courage to Heal*. This book argues that forgotten memories of incest and abuse may lie behind people's feelings of powerlessness, inadequacy, vulnerability, and a long list of other unpleasant thoughts and emotions (Bass & Davis, 1988). The authors state, "If you . . . have a feeling

that something abusive happened to you, it probably did" (pp. 21–22). None of these assertions, however, rests on anything more solid than speculation. Thus, say memory experts Elizabeth Loftus and Katherine Ketcham (1994), it seems likely that *The Courage to Heal* has contributed to many false memories of sexual abuse.

We should also note that the issue of recovered memories is both complex and charged with emotion—a situation ripe for emotional bias. Not only does the issue of sexual abuse strike many people close to home, but none of us wants to turn our back on those who believe they have been victims of sexual abuse. Yet what we know about memory tells us that we should not accept long-forgotten traumatic memories without corroborating evidence.

Does the Reasoning Avoid Common Fallacies?

When we observe associations between things, we have a natural tendency to suspect that one might cause the other—as we associate overeating with gaining weight or spending time in the sun with a sunburn. Most of the time this logic serves us well, but occasionally it leads us to the wrong conclusions—as when we conclude that a chill causes a cold or that eating sweets causes a "sugar high." Experts call this the post hoc fallacy: *Post hoc* literally means "after the fact," and the idea is that looking back at events occurring in succession (e.g., sugar followed by excitement), we may erroneously conclude that the first event is the cause of the second.

How could the post hoc fallacy contribute to the "recovered memory" controversy? When people "look back" in their memories and find a memory (accurate or not) of abuse that seems to be associated with their current unhappiness, they assume the abusive event (again, whether real or erroneously remembered) is the cause of their current mental state. But, as we have seen, this conclusion may be faulty. Ironically, this can reinforce one's belief in the memory—through confirmation bias.

What Conclusions Can We Draw?

So, where does this leave us? Weigh the evidence yourself on a case-by-case basis, mindful of the possibility that emotional biases can affect your thinking. Keep in mind the following points as well:

- Sexual abuse of children *does* occur and is more prevalent than most professionals suspected just a generation ago (McAnulty & Burnette, 2004).
- On the other hand, memories cued by suggestion, as from therapists or police officers, are particularly vulnerable to distortion and fabrication (Loftus, 2003a). So, without independent evidence, there is no way to tell whether a recovered memory is true or false.
- Remember that people can feel just as certain about false memories as accurate ones.
- Although traumatic events can be forgotten and later recalled, they are much more likely to form persistent and intrusive memories that people cannot forget. Nevertheless, cases such as that of Ross show us that recovered memories of abuse can be true.
- Early memories, especially those of incidents that may have happened in infancy, are likely to be fantasies or misattributions. As we have seen, episodic memories of events before age 3 are rare (Schacter, 1996).
- One should be more suspicious of claims for memories that have been "repressed" and then "recovered" years later than of claims for memories that have always been available to consciousness.

Summary: Memory

Chapter Problem

How can our knowledge about memory help us evaluate claims of recovered memories?

- Evidence clearly shows that most people form powerful memories of traumatic events, rather than repressing them.
- Up to one-third of the population has been demonstrated by research to be susceptible to relatively easy formation of false memories. Thus, suggestive questioning techniques by therapists or other authority figures may inadvertently lead a person to create false memories that are in accordance with a therapist's suggestion.
- People with an avoidant attachment style have been found by researchers to be more likely to suppress traumatic memories than people with other attachment styles.

What Is Memory?

> **Core Concept 5.1**
>
> **Human memory is an information processing system that works constructively to encode, store, and retrieve information.**

Human memory, like any **memory** system, involves three important tasks: **encoding**, **storage**, and **retrieval**. Although many people believe that memory makes a complete and accurate record, cognitive psychologists see human memory as an information processing system that interprets, distorts, and reconstructs information. **Eidetic imagery**, however, is a rare and poorly understood form of memory that produces especially vivid and persistent memories that may interfere with thought. It is not clear how eidetic memory fits with the widely accepted three-stage model of memory.

How Do We Form Memories?

> **Core Concept 5.2**
>
> **Each of the three memory stages encodes and stores memories in a different way, but they work together to transform sensory experience into a lasting record that has a pattern or meaning.**

The memory system is composed of three distinct stages: **sensory memory**, **working memory**, and **long-term memory**. The three stages work together sequentially to convert incoming sensory information into useful patterns or concepts that can be stored and retrieved when needed later.

Sensory memory holds 12 to 16 visual items for up to just a second or two, making use of the sensory pathways. A separate sensory register for each sense holds material just long enough for important information to be selected for further processing.

Working memory, which has the smallest storage capacity of the three stages and a duration of 20 to 30 seconds, draws information from sensory memory and long-term memory and processes it consciously. Theorists have proposed at least four components of working memory: a *central executive,* a *phonological loop,* a *sketchpad,* and an *episodic buffer.* We can cope with its limited duration and capacity by **chunking** and **maintenance rehearsal**. The biological basis of working memory is not clear, but it is believed to involve actively firing nerve circuits, probably in the frontal cortex.

Long-term memory has apparently unlimited storage capacity and duration. It has two main partitions, **declarative memory** (for facts and events) and **procedural memory** (for perceptual and motor skills). Declarative memory can be further divided into **episodic memory** and **semantic memory**. Semantic information is encoded, stored, and retrieved according to the meaning and context of the material. The case of H. M. showed that the hippocampus is involved in transferring information to long-term memory. Other research has found long-term memories associated with relatively permanent changes at the synaptic level.

Flashbulb memories are common in highly emotional experiences. While most people have a great deal of confidence in such vivid memories, studies have shown these memories are no more accurate than everyday memories.

How Do We Retrieve Memories?

> **Core Concept 5.3**
>
> **Whether memories are implicit or explicit, successful retrieval depends on how they were encoded and how they are cued.**

Information can be stored as **explicit** or **implicit memories**. **Elaborative rehearsal** and **depth-of-processing** play the biggest roles in successful retrieval. The success of a memory search also depends, in part, on the **retrieval cues**. Implicit memories can be cued by **priming**. Explicit memories can be cued by various **recall** or **recognition** tasks, although some tasks require remembering the **gist** rather than exact details. The accuracy of memory retrieval also depends on **encoding specificity** and mood. Relatively little is known about the conditions required for successful **prospective memory**. When there is a poor match between retrieval cues and the encoding, we may experience the **TOT phenomenon**.

Why Does Memory Sometimes Fail Us, and What Can We Do About It?

> **Core Concept 5.4**
>
> **Most of our memory problems arise from memory's "seven sins"—which are really by-products of otherwise adaptive features of human memory.**

Memory failures involve the "seven sins" of memory. These include forgetting, resulting from weakening memory traces **(transience)**, lapses of attention **(absent-mindedness)**, and inability to retrieve a memory **(blocking)**. Some forgetting can be attributed to a cause of transience known as **interference**. Memory can also fail when recollections are altered through **misattribution**, **suggestibility**, and *bias*. An important example involves eyewitness memories, which are subject to distortion. Suggestibility can also produce false memories that seem believable to the rememberer. The final "sin" of **persistence** occurs when

unwanted memories linger in memory even when we would like to forget them.

The "seven sins" of memory, however, are by-products of a memory system that is well suited to solving problems of day-to-day living. Some of these problems can be overcome by **mnemonic strategies**, such as the **method of loci**, **natural language mediators**, and other associative methods. The learning of concepts, however, requires special strategies geared to learning the **gist** of the material and to avoiding the two memory "sins" of transience and blocking.

Critical Thinking Applied: The Recovered Memory Controversy

Most people mistakenly believe that traumatic memories are subject to repression and can later be recovered accurately through hypnosis or other techniques. Evidence indicates that not only do most people *not* repress traumatic memories, suggestive techniques can actually enable creation of false memories.

Additional Video Resources

Here are some additional resources we think you will find both interesting and of personal value to understanding the concept of memory.

WATCH Why Eyewitnesses Get It Wrong

Forensic Psychologist Scott Fraser studies how humans remember crimes—and bear witness to them. In this powerful talk, which focuses on a deadly shooting at sunset, he suggests that even close-up eyewitnesses to a crime can create "memories" they could not have seen. Why?

WATCH

Can we edit the content of our memories? It's a sci-fi-tinged question that Steve Ramirez and Xu Liu are asking in their lab at MIT. Essentially, the pair shoot a laser beam into the brain of a living mouse to activate and manipulate its memory. In this unexpectedly amusing talk they share not only how, but—more importantly—why they do this.

Chapter 6
Thinking and Intelligence

Are the founders of Google geniuses? This chapter explores thinking and intelligence, and what it really means to be a "genius"

Core Concepts

6.1 Thinking is a cognitive process in which the brain uses information from the senses, emotions, and memory to create and manipulate mental representations such as concepts, images, schemas, and scripts.

6.2 Good thinkers not only have a repertoire of effective strategies, called algorithms and heuristics, they also know how to avoid common impediments to problem solving and decision-making.

6.3 Intelligence testing has a history of controversy, but most psychologists now view intelligence as a normally distributed trait that can be measured by performance on a variety of cognitive tasks.

6.4 Some psychologists believe that intelligence comprises one general factor, g, while others believe that intelligence is a collection of distinct abilities.

6.5 While most psychologists agree that both heredity and environment affect intelligence, they disagree on the source of IQ differences among racial and social groups.

FOLLOW YOUR PASSIONS, AND YOU, TOO, MAY BECOME A MULTIMILLIONAIRE. At least that's what happened to Sergey Brin and Larry Page, graduate students in computer science at Stanford University. Both were deeply interested in finding a quicker way to search the Internet and extract specific information from its abundance of informational riches.

It was January of 1996, and both Brin and Page had some creative ideas about how to search the Web more efficiently than existing search engines could. After combining forces, the first thing this duo did was to build a computer in Larry's dorm room, equipping it with as much memory as they could afford.

The first-generation search engine to come out of their collaboration was Backrub, so called because it could identify and follow "back links" to discover which websites were listing a particular page—giving them an index of how valuable users had found a site to be. And, while their search engine performed well, Brin and Page couldn't get any of the big computer companies or existing Internet entrepreneurs to buy their design. So they started their own business—with a little financial help from their family and friends. One friend of a Stanford faculty member saw so much promise in their enterprise that he wrote them a check for $100,000. The check sat in Page's desk drawer for 2 weeks because they hadn't yet set up a company that could cash the check.

In most respects, Brin and Page's search engine worked like any other Web-searching software. It sent out electronic "spiders" that crawl across Web pages, looking for important terms and listing them in an index, along with their Web addresses. It also followed links on the Web pages it scanned (both forward and backward) and listed more terms. But the secret ingredient for their success remains as closely guarded as the formula for Coca-Cola. It involves the way results are ranked for presentation to the user. More often than not, it manages to put the sites users want most near the top of a list that can include millions of possible sources. Thus, the software is designed to serve as the link between a concept in the user's mind and billions of words on the Web. In other words, Brin and Page had to organize their search engine to "think" as much as possible like a person—which is what this chapter is about.

The public seemed to like their search engine. In fact, the public liked it far better than did the big companies that had turned it down. And over the next decade, it became "the little engine that could." First, it outgrew Page's dorm room and—in the great tradition of American inventors and rock bands—into a garage. Today, it has offices spread throughout the United States and 39 other countries, with more than 50,000 employees. It also has a reputation as the most comprehensive of search engines, indexing key words from billions of Web pages. Every day, it processes hundreds of millions of search requests. Things got so busy that Brin and Page had to take a leave from graduate school to run the company—

which they renamed after the term mathematicians use for the number 1 followed by 100 zeros. They called it Google.

What Is Genius, and Can Anyone Become One?

In some respects, Brin and Page are like other legendary pioneers in the computer field: the two Steves, Jobs and Wozniak, who started Apple Computer in a garage, and Bill Gates who, with his friend Paul Allen, launched Microsoft on a shoestring. All could be called "geniuses," a term that frames our initial problem for this chapter:

> **CHAPTER PROBLEM: What produces "genius," and to what extent are the people we call "geniuses" different from the rest of us?**

As we consider this problem, here are some additional questions worth pondering:

- Thomas Edison once said that genius is 1% inspiration, 99% perspiration. If so, does that mean genius is mainly a matter of high motivation rather than aptitude or talent?
- Is genius a product mainly of nature or of nurture?
- Do geniuses think differently from the rest of us? Or do they just use the same thought processes more effectively?
- Could Einstein (for example), whose specialty was physics, have been a genius in painting or literature or medicine if he had chosen to do so? That is, are there different kinds of genius? And is the potential for genius specific to a particular field?

We will address all these questions in the following pages. But first, let's return to Google and the computer metaphor for the human mind, as we begin our inquiry into thinking and intelligence.

Despite its phenomenal success, Google is only a pale imitation of the human mind. Sure, it can scan its memory, amassed from up to 1 trillion Web pages, and return more than 1 billion links on, say, the term "search engine" in about a half second. But ask it what food to serve at a birthday party, and it will merely serve up (at this writing) 40,600,000 links to the terms "birthday" and "party" and "food." Unlike most human minds, Google and its network of supportive hardware is clueless—just like the computer on your desk. Computers just don't index information by *meaning*.

Nevertheless, computers in the hands of cognitive scientists can be powerful tools for studying how we think—for three reasons.

1. First, these scientists use computers in brain imaging studies, which have shown the brain to be a system of interrelated processing modules, as we have seen.
2. Second, researchers use computer simulations that attempt to model human thought processes.

3. And third, while they haven't yet made a computer function exactly like a brain, cognitive scientists have adopted the computer as a metaphor for the brain, as a processor of information.

This **computer metaphor** suggests that thinking is nothing more, or less, than information processing. The information we use in thought can come from raw data we receive from our senses, but it can also come from meaningful *concepts* in long-term memory. As you can see, then, the psychology of thinking deals with the same processes we discussed in connection with learning and memory.

To be sure, the computer metaphor is not perfect. Not only do computers fail to grasp meaning, but, as we will see, they have no capacity for abstract thought or humor (although they are *very* good at transmitting the millions of jokes shared on email and Facebook each day). Consequently, some psychologists encourage moving beyond the computer metaphor to talk about the sort of modular, parallel information processing that we now know the brain really does when it thinks. Evolutionary psychologists, for example, suggest the brain is more like a Swiss Army knife—an all-purpose tool that can adapt to many uses, with a variety of specialized components for particular functions. Nevertheless, the computer metaphor is a good place to begin our thinking about thought.

Key Question: What Are the Components of Thought?

| Core Concept 6.1
| **Thinking is a cognitive process in which the brain uses information from the senses, emotions, and memory to create and manipulate mental representations such as concepts, images, schemas, and scripts.**

Solving a math problem, deciding what to do Friday night, and indulging a private fantasy all require thinking. We can conceive of thinking as a complex act of **cognition**—information processing in the brain—by which we deal with our world of ideas, images, feelings, desires, and experience. As Core Concept 6.1 notes, this information can come from within and from without, but it always involves some form of mental representation*:*

| Thinking is a cognitive process in which the brain uses information from the senses, emotions, and memory to create and manipulate mental representations such as concepts, images, schemas, and scripts.

These mental representations, then, serve as the building blocks of cognition, while thinking organizes them in meaningful ways. The ultimate results are the higher thought processes we call reasoning, imagining, judging,

deciding, problem solving, expertise, creativity, and—sometimes—genius.

By the end of this section, you will be able to:

6.1   **Explain the mental categories of concepts**

6.2   **Explain why people's cognitive maps can be vastly different**

6.3   **Describe what role of PET scans, MRI, and fMRI have revealed about thought and the brain**

6.4   **Evaluate intuition as an emotional component of thinking**

6.1: Concepts

Objective: **Explain the mental categories of concepts**

Have you ever visited a new place only to feel like you had been there before? Or had a conversation with someone and felt the experience was uncannily familiar? If so, you have experienced a phenomenon known as *déjà vu* (from the French for "seen before"). The term refers to the strange sense that your present experience matches a previous experience, even though you cannot retrieve the explicit memory. This feeling reflects the brain's ability to treat new stimuli as instances of familiar categories, even if the stimuli are slightly different from anything it has encountered before. Why is that important? Imagine what life would be like if, every time we started a new class in school, for example, we couldn't access any of our previous school experiences, so we had to start from scratch to figure out what to do, how to study, and what the point of school even was. This ability to assimilate experiences, objects, or ideas into familiar mental categories—and take the same action toward them or give them the same label—is one of the most basic attributes of thinking organisms (Mervis & Rosch, 1981).

The mental categories we form in this way are known as **concepts**. We use them as the building blocks of thinking because they help us organize our knowledge (Goldman-Rakic, 1992). Concepts can represent:

- Classes of objects such as "chair" or "food"
- Living organisms such as "birds" or "buffaloes"
- Events like "birthday parties"
- Properties (such as "red" or "large")
- Abstractions (such as "truth" or "love")
- Relations (such as "smarter than")
- Procedures (such as how to tie your shoes)
- Intentions (such as the intention to break into a conversation) (Smith & Medin, 1981)

But because concepts are mental structures, we cannot observe them directly. For the cognitive scientist, this means inferring concepts from their influence on behavior

or on brain activity. For example, you cannot be sure another person shares your concept of "fun," but you can observe whether he or she responds the same way you do to stimuli you interpret as "fun."

6.1.1: Two Kinds of Concepts

Everyone conceptualizes the world in a unique way, so our concepts define who we are. Yet, behind this individual uniqueness lie similarities in the ways we all form concepts. In particular, we all distinguish between natural concepts and artificial concepts (Medin and others, 2000).

1. **Natural concepts** are imprecise mental categories that develop out of our everyday experiences in the world. You possess a natural concept of "bird" based on your experiences with birds, which in turn invokes a mental **prototype**, a generic image representing a typical bird from your experience (Hunt, 1989). To determine whether an object is a bird or not, you mentally compare it to your bird prototype—and the closer it matches, the quicker you can make your decision. Most people take less time to recognize an eagle as a bird than a penguin, for example (Rips, 1997). Our personal prototypes encompass all kinds of natural concepts, including friendship, intimacy, and sex. And, for all these, one person's prototype might differ from that of someone else, which can create the basis for misunderstanding in our relationships. Natural concepts are sometimes called "fuzzy concepts" because of their imprecision (Kosko & Isaka, 1993).

2. By comparison, **artificial concepts** are defined by a set of rules or characteristics, such as dictionary definitions or mathematical formulas. The definition of "rectangle" is an example. Artificial concepts represent precisely

Your natural concept of "bird" involves a prototype that is probably more like an eagle than a penguin. Hence, you would likely classify an eagle as a bird faster than you would a penguin. Biology majors, however, may also have an artificial concept of "bird" that works equally well for both.

defined ideas or abstractions rather than actual objects in the world. So, if you are a zoology major, you may also have an artificial concept of "bird," which defines it as a "feathered biped." In fact, most of the concepts you learn in school are artificial concepts—such as "cognitive psychology," and even the concept of "concept"!

6.1.2: Concept Hierarchies

We organize much of our **declarative memory** into **concept hierarchies**, arranged from general to specific, as illustrated in Figure 6.1. For most people, the broad concept of

Figure 6.1 Hierarchically Organized Structure of Concepts

Level 1

Animal
Has skin
Can move around
Eats
Breathes

Level 2

Bird
Has wings
Can fly
Has feathers

Fish
Has fins
Can swim
Has gills

Level 3

Canary
Can sing
Is yellow

Ostrich
Has long thin legs
Is tall
Can't fly

Shark
Can bite
Is dangerous

Salmon
Is pink
Is edible
Swims upstream
to lay eggs
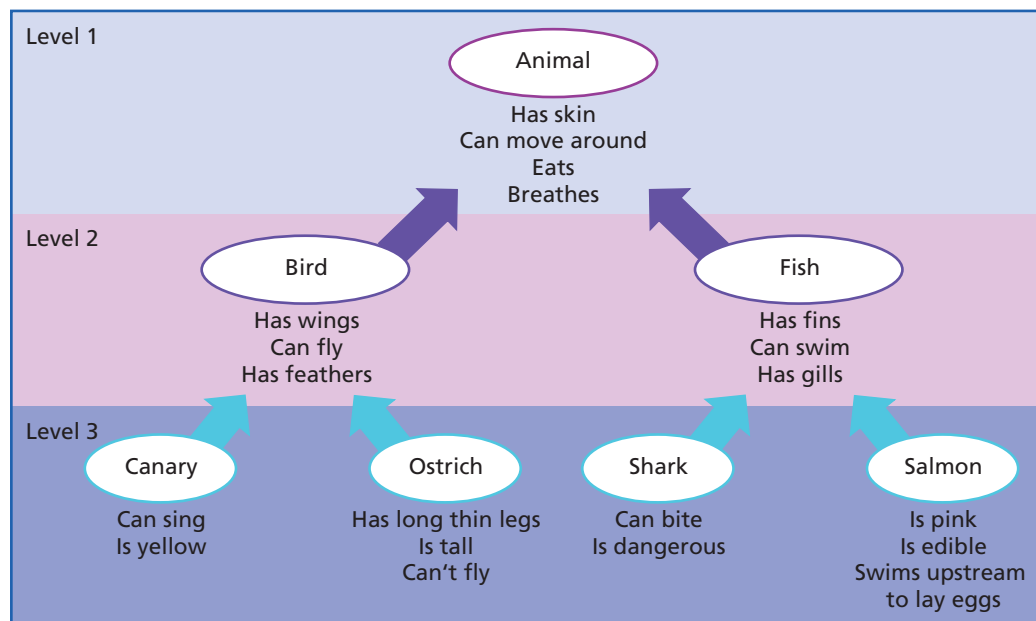
"animal" has several subcategories, such as "bird" and "fish," which are divided, in turn, into specific forms, such as "canary," "ostrich," "shark," and "salmon." The "animal" category may itself be a subcategory of the still larger category of "living beings." Also, we can often link each category to a variety of other concepts: For example, some birds are edible, some are endangered, and some are national symbols. In this way, our concept hierarchies are often intricate webs of concepts and associations.

WRITING PROMPT

Constructing Your Own Hierarchy

After reviewing Figure 6.1, choose a broad concept of your own, such as school, sports, entertainment, environment, art, etc. Then identify three subcategories for your chosen concept (creating Level 2), and two forms (Level 3) for each of the three categories.

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

6.1.3: Culture, Concepts, and Thought

Concepts can carry vastly different meanings in different cultures. For example, the concepts of "democracy" and "freedom," so dear to Americans, may have the connotation of chaos, excess, and rudeness in parts of Asia and the Middle East.

Americans also differ from many Asians in the ways they deal with conflicting ideas and contradictions (Peng & Nisbett, 1999). We can see this in the way the Chinese have dealt with the conflicting ideologies of capitalism and communism by allowing elements of both to flourish in their economy, an approach many Americans find difficult to understand. The Chinese culture encourages thinkers to keep opposing perspectives in mind and seek a "middle way," while American culture tends toward thinking in more polarized "either–or" terms—capitalism *or* communism.

Another big cultural difference involves the use of logic: Many cultures do not value the use of logical reasoning as much as do Europeans and North Americans (Bower, 2000a; Nisbett and others, 2001). Some seek "truth" by comparing new ideas with the wisdom of sacred writings, such as the Koran, the Bible, or the Upanishads. Even in the United States, many people place higher value on qualities variously known as "common sense," which refers to thinking based on experience rather than on logic.

What is the lesson to be learned from these cultural differences? While there are some universal principles of thought that cut across cultures, they involve very basic processes, such as the fact that everyone forms concepts. But when it comes to *how* they form concepts or the *meaning* they attach to them, we should be cautious about assuming that others think as we do.

6.2: Imagery and Cognitive Maps

Objective: Explain why people's cognitive maps can be vastly different

We think in words, but we also think in pictures, spatial relationships, and other sensory images. Taking a moment to think of a friend's face, your favorite song, or the smell of warm cookies makes this obvious. Visual imagery adds complexity and richness to our thinking, as do images that involve the other senses (sound, taste, smell, and touch). Thinking with sensory imagery can be useful when solving problems in which relationships can be conveyed more clearly in an image than in words. That is why texts such as this one often encourage visual thinking by using pictures, diagrams, and charts.

A cognitive representation of physical space is a special form of visual concept called a *cognitive map*. Cognitive maps help you get to your psychology class, and enable you to give friend directions to a nearby theater or deli. By using cognitive maps, people can move through their homes with their eyes closed or go to familiar destinations even when their usual routes are blocked.

As you can see in Figure 6.2, though, people's cognitive maps can be vastly different. Just like other elements of thinking, they are based on our unique perceptions. Our mental maps mirror the view of the world that we develop from the perspective of our own culture. The maps you see in Figure 6.2 came from a study aimed at understanding how nearly 4,000 students from 71 cities in 49 countries visualize the world (Saarinen, 1987).

We all use cognitive maps to navigate through our worlds. Curious to see how well your own cognitive map works? Try this simulation!

WRITING PROMPT

Testing Your Own Cognitive Map

Discuss your results and your reactions to the simulation exercise you just completed. What did you learn from this simulation? What surprised you?

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

Figure 6.2 Chicagocentric View Versus Australiocentric View of the World
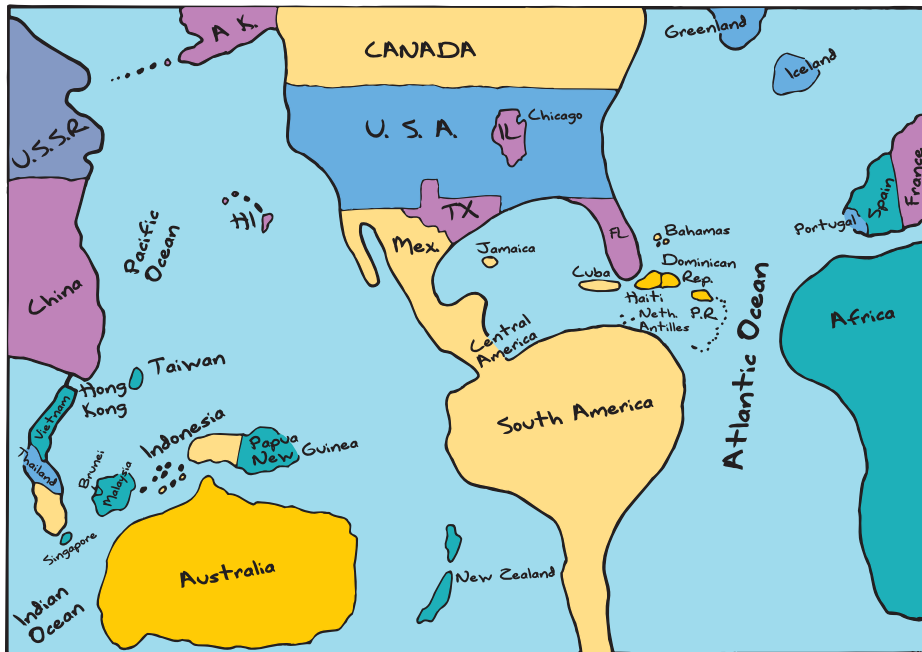
How do these students' sketches compare with your view of the world?
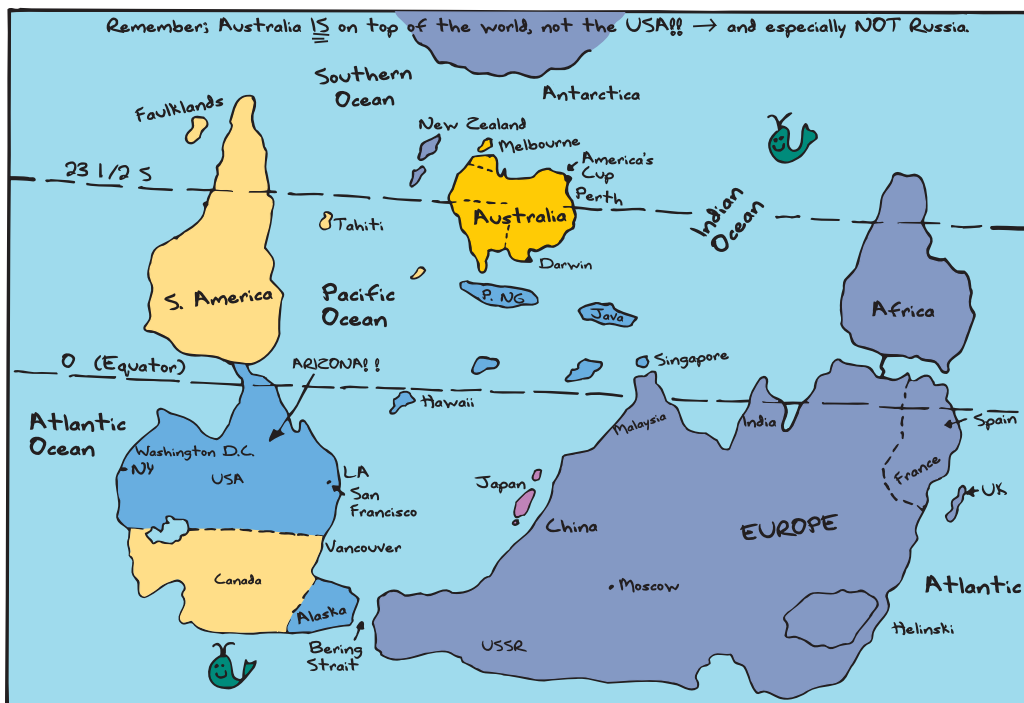
Now who's "down under"? It probably would not occur to most Americans to draw a map "upside down" like this one drawn by an Australian student, placing Australia near the center of the world.

6.3: Thought and the Brain

Objective: Describe what role of PET scans, MRI, and fMRI have revealed about thought and the brain

Developments in brain imaging have allowed cognitive researchers to begin mapping the mind itself (Ashby & Waldron, 2000). Scientists can now connect certain thoughts, such as "dog" or "pencil," with specific electrical wave patterns in the brain (Garnsey, 1993; Osterhout & Holcomb, 1992). They do this by repeatedly presenting a stimulus (such as the word *dog* flashed on a screen) to a volunteer "wired" to record the brain's electrical responses. While the brain waves on just one trial may show no clear pattern, a computer can average many brain wave responses to a single, repeated stimulus (such as a tone or a visual image), eliminating the random background "noise" of the brain and isolating the unique brain wave pattern evoked by that stimulus (Kotchoubey, 2002).

Other methods tell us which parts of the brain switch on and off while we think. With **PET scans**, **MRI**, and **fMRI**, neuroscientists have identified brain regions that become active during various mental tasks. Two broad conclusions have come from this work.
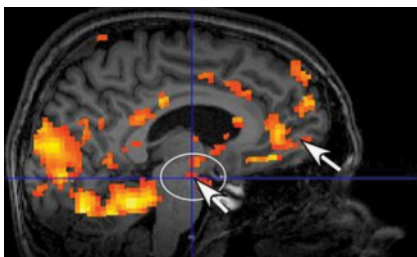
1. First, *thinking is an activity involving widely distributed areas of the brain—not just a single "thinking center."*
2. Second, *neuroscientists now see the brain as a community of highly specialized modules, each of which deals with different components of thought* (Cree & McRae, 2003).

Moreover, the brain uses some of the same circuitry to generate thoughts involving images as it does for sensing and perceiving images. Thus, visual imagery drawn from memory activates the visual cortex, while auditory memories engage the auditory cortex (Behrmann, 2000). And thinking with language may involve different regions, depending on the topic. One brain-imaging study found that most jokes tickle us mainly in the language-processing areas of the cortex, while sound-alike puns activate the brain's sound-processing circuits as well (Goel & Dolan, 2001). In general, the picture of thought coming out of this work reveals thinking as a process composed of many modules acting in concert.

The **frontal lobes** of the brain play an especially important role in coordinating mental activity as we make decisions and solve problems (Helmuth, 2003a; Koechlin and others, 2003). To do so, the prefrontal cortex (in the frontal lobes, just above your eyes) performs three different tasks:

1. Keeping track of the *episode* (the situation in which we find ourselves)
2. Understanding the *context* (the meaning of the situation)
3. Responding to a specific *stimulus* in the situation

Here's how it works. Suppose you are driving to school, and you pass an injured dog on the side of the road (episode) that is clearly still alive but can't seem to walk (the stimulus). What do you do? If it were your neighborhood, and you recognized the dog, you would most likely stop and help, perhaps by finding the dog's owner or taking the dog to a vet. But what if you didn't live in that neighborhood and you didn't know the dog? Or what if you had an exam in the class you were trying to get to, and stopping to help might make you late—or even miss the exam? What if you were afraid of dogs? These different contexts would figure into your decision, all in just a few seconds. From a neuroscience perspective, the interesting thing is that all these tasks are performed by different combinations of brain modules that work together in seamless synchronicity. It's an impressive and sophisticated system.

6.4: Intuition

Objective: Evaluate intuition as an emotional component of thinking

Psychologists have long known that when people make decisions—even important ones, such as buying a house or selecting a spouse—they sometimes make quick judgments based on feelings as well as reason (Gladwell, 2005; Myers, 2002). When we think about objects and events in our world, we attach "values" to them, in the form of the positive or negative feelings that we call emotions. Accordingly, when we make decisions among alternative courses of action, we weigh each alternative according to the emotion we have assigned it. We, of course, have the ability to weigh alternatives more methodically and logically, but emotions are always part of the mix in our decisions, especially in the quick-thinking process that we call **intuition**.

This fMRI scan shows activity in the brains of people who are madly in love. An area of the **limbic system** associated with the reward system is highly active, similar to the response in the brain to cocaine. The **prefrontal cortex**, associated with thinking, reasoning, and planning, is also active.

This emotional component of thinking—like many other complex cognitive tasks—involves the prefrontal cortex, which unconsciously factors emotional "hunches" into our decisions in the form of information about past experiences, as well as our needs, desires, and emotions. Individuals with severe damage to this area of the brain may display little emotion or have impairments in intuition. As a result, they frequently make unwise choices when faced with decisions (Damasio, 1994).

How accurate is our intuition? What do you think?

Sometimes our intuitive snap judgments, which may feel like truth, are merely our prejudices and biases (Myers, 2002). That has been shown to be true of executives, for example, who commonly overestimate the power of their intuition by believing they are especially good judges of other people's abilities and character. Accordingly, they often rely exclusively on in-person interviews for hiring, even though studies show they usually make better judgments when factoring in objective data, such as educational levels and test scores (Dawes, 2001).

Sometimes, however, quick intuitive judgments can be surprisingly on target. Dr. Nalini Ambady found that people make remarkably accurate judgments of a person's personality traits after viewing only a 6-second video clip. Similarly, students' quick judgments about a professor's teaching effectiveness correlate highly with end-of-course ratings (Ambady & Rosenthal, 1993; Greer, 2005). Princeton psychologist Daniel Kahneman suggests that intuition is an evolutionary invention that helped our ancestors make snap judgments in difficult and dangerous situations (2003).

6.4.1: When Can You Rely on Intuition?

So, where do the seemingly contradictory findings about intuition leave us? The accuracy of our intuition may depend on, for one thing, the context in which we use it. In general, our "instincts" about personality are often correct—but, notes psychologist Frank Bernieri, the serial killer Ted Bundy made a good first impression, demonstrating that we do make occasional mistakes (Winerman, 2005c). When it comes to statistical or numerical judgments, however, our intuition is much more likely to be wrong, says Kahneman. (How many English words end with *r?* Or how likely is it that I will be killed by a terrorist?) We will examine some reasons for these particular errors in the next few pages.

In addition to context, our intuition may also be more reliable in complex situations when time is limited: In those situations, our conscious processing skills—located in our limited working memory—simply may not be capable of handling the complexity or the number of factors that need to be quickly weighed. Here's an example:

Participants in an experiment were asked to choose the best of four apartments after reading a list of a dozen factors about each one. The descriptions were designed to be both numerous and complex, including both positive features ("it's in a nice area") and negative ones ("the landlord is troublesome"). There were three experimental conditions:

1. Some participants had to choose right away.
2. Some were given several minutes to think carefully before choosing.
3. Some, after reading the information, were distracted for several minutes by a tedious task before choosing.

Which of the given conditions assessed pure intuition? And which group chose the best apartment? What do you think?

It was the third condition that aimed to assess pure intuition, because while there was a few minutes between receiving the information and making the decision, there was no opportunity for cognitive analysis due to the distraction. Thus, the decision had to be made intuitively. And the results were provocative. Participants in the distracted (intuitive) group were far better at choosing the most desirable apartment than either of the other groups (Dijksterhuis, 2004). Thus, in complex situations involving time pressures or distractions, our intuition may be a better guide than an incomplete attempt at logical analysis.

When time is not short, however, expertise makes a difference, as shown in a study that compared experienced college students to novices in dealing with typical college problems (Pretz, 2008). Yale seniors solved problems more effectively when they thought through a problem than when they simply followed their intuition. Conversely, freshmen had more success with intuition. Researchers theorize that, when a person has the expertise necessary to analyze a situation, intuition may impede clear thinking. In the absence of experience, though, intuition trumps a clumsy attempt at analysis.

The bottom line is this: It is important to recognize when we are making intuitive judgments and to consider the context, the time available, and our own expertise in that area. We must also be mindful that intuition can be wrong: As we saw in our discussion of memory, confidence is not a reliable indicator of accuracy. For psychologists, the task that lies ahead may be to help us learn to use intuition more accurately (Haslam, 2007). As one researcher suggests, in many situations, the best solution may be to assess the facts, then hand them over to our unconscious. In that way, we may learn to balance our use of analysis and intuition (Dijksterhuis, 2004).

Schemas and Scripts Help You Know What to Expect

Much of your knowledge is stored in your brain as **schemas** (Oden, 1987): clusters of related concepts that provide a framework for thinking about objects, events, ideas, or even emotions. So you probably have schemas that represent "school," "Internet," "vacation," "music," and "fear." Let's look at some important ways that these schemas are used.

Expectations

Schemas are one of the attributes that Google and other search engines lack, so they have no real understanding of "birthday" or "psychology" or "nonfat mocha." But for us, schemas provide contexts and expectations about the features likely to be found when you encounter familiar people, situations, images, and ideas (Baldwin, 1992). For example, to an airline passenger, the word *terminal* probably conjures up a schema that includes scenes of crowds, long corridors, and airplanes. For a heart attack victim, however, the schema for *terminal* might include feelings of anxiety and thoughts of death. And for an auto mechanic, *terminal* might mean a connection for a battery cable. In all these ways, our schemas provide a context for interpretation.

Schemas can be helpful in making quick decisions, but schema-driven decisions aren't always smart judgments. One researcher at the University of Chicago uses a video game to test the effects of people's schemas and expectations on their decision-making. In the game, participants have less than 1 second to decide a person in an image is carrying a gun, a wallet, or a cell phone, and then must press a button to shoot or not to shoot. How did schemas influence participants' judgements? Researcher Joshua Correll and his colleagues (2007) found that mistakes followed a clear pattern: unarmed Blacks were more likely than unarmed Whites to be shot, demonstrating the power of schemas and expectations in our thought

This is an example of the type of image used in Correll's study of how our schemas influence our decision-making. Study results powerfully demonstrated how nonconscious schemas can contribute to prejudice and discrimination.

processes. Follow-up research indicated that police officers made fewer mistakes than civilians, and—for all participants—practicing the game improved accuracy, indicating that schemas can be revised with conscious effort.

Making Inferences

New information, which is often incomplete or ambiguous, makes more sense when you can relate it to existing knowledge in your stored schemas. Schemas, then, enable you to make inferences about missing information. Consider this statement:

Tanya was upset to discover, on opening the basket, that she'd forgotten the salt.

With no further information, what can you infer about this event? *Salt* implies that the basket is a picnic basket containing food. The fact that Tanya is upset that the salt is missing suggests that the food in the basket is food that is usually salted, such as hard-boiled eggs. You automatically know what other foods might be included and, equally important, what definitely is not: Everything in the world that is larger than a picnic basket and anything that would be inappropriate to take on a picnic—from a boa constrictor to bronze-plated baby shoes. Thus, the body of information you now have has been organized around a "picnic-basket" schema. So by relating the statement about Tanya to your schema, the statement gains meaning.

In a practical application of schema theory, researchers taught low-achieving math students to classify word problems into a few different types. For example, one type involved a "change" schema. The students learned that all "change" problems involve a story, such as this one: "Rudy had three pennies, and his mother gave him four more. How many does he now have?" They also learned common strategies for solving "change" problems. After several months of schema-based instruction, test results showed these students had made tremendous gains in their math scores—enough to move into the "above average" ranks (Jitendra and others, 2007). Classifying problems by schema helped them gain access to effective strategies for solutions.

Schemas and Humor

Schemas also serve as the foundation for much of our humor (Dingfelder, 2006). We often find things funny when they invoke two or more incongruous or incompatible schemas at once. Consider this joke:

A horse walks into a bar, and the bartender says, "Why the long face?"

This brief (and possibly lame) joke features multiple incongruous schemas, including:

(a) Our knowledge that horses don't frequent bars

(b) The confusion over the horse's long nose and the "long face" as a metaphor for sadness

Not everything we find incongruous is funny, however. A person being struck by a car on the sidewalk is not humorous.

Generally, if the conflicting frames of reference involve threat or if the situation holds a cherished belief up to ridicule, we won't find it funny. If, however, schemas in a joke demean someone whom we consider threatening, we may well find it humorous. This accounts for much humor that we call racist, sexist, or political.

Scripts as Event Schemas

We have schemas not only about objects and events but also about people, roles, and ourselves. These schemas help us decide what to expect or how people should behave in specific circumstances. An event schema or **script** consists of knowledge about sequences of interrelated, specific events and actions expected to occur in a certain way in particular settings (Baldwin, 1992). We have scripts for going to a restaurant, taking a vacation, listening to a lecture, going on a first date, and even making love. Conflict can arise, however, when your script differs from that of someone else in your world.

Cultural Influences on Scripts

Scripts in other cultures may also differ substantially from ours. For example, American women living in conservative Arab countries often report that many behaviors they take for granted at home—such as walking unescorted in public, wearing clothing showing their faces and legs, or driving a car—are considered scandalously inappropriate by citizens of their host country. To maintain good relations, many women change their behaviors to accommodate local customs. Similarly, Americans expect visitors from other countries to conform to American practices, such as tipping servers 15% to 20% at a restaurant—far more than is customary in many other countries.

The cultural diversity of scripts around the world is the result of each culture's unique schema for viewing the world, which includes its values. We tend to feel comfortable with others who share our scripts because we see things the same way and know what to expect (Abelson, 1981; Schank & Abelson, 1977). Unfortunately, our discomfort with unfamiliar scripts can sometimes create divides, as when people say, "I tried to interact, but it was so awkward that I don't want to try again" (Brislin, 1993). In our increasingly multicultural world, understanding the power of scripts and schemas can help us be more open to others' scripts and more resilient in trying new ways to bridge the gaps. After all—variety is, they say, the spice of life.

Key Question: What Abilities Do Good Thinkers Possess?

Core Concept 6.2
Good thinkers not only have a repertoire of effective strategies, called algorithms and heuristics, they also know how to avoid common impediments to problem solving and decision-making.

The popularity of lotteries and casino games, in which chances of winning are small, shows us that human thought is not always logical. Instead, we might say thinking is *psycho*logical—which has some advantages. Departures from logic allow us to fantasize, daydream, act creatively, react unconsciously, respond emotionally, and generate new ideas.

We are, of course, capable of careful reasoning. After all, our species did invent that most logical of devices, the computer. Still, the psychology of thinking teaches us we should not always expect people to behave in a strictly logical manner. This ability to think *psycho*logically sometimes enhances our ability to solve problems. Good thinkers know how to use effective thinking strategies and how to avoid ineffective or misleading strategies. We also suggest that *psycho*logical thinking is more useful than mere logic because it helps us make decisions rapidly in a changing world that usually furnishes us incomplete information. Consider the technical language of the core concept:

Good thinkers not only have a repertoire of effective strategies, called algorithms and heuristics, they also know how to avoid common impediments to problem solving and decision-making.

By the end of this section, you will be able to:

6.5 Evaluate strategies for and barriers to effective problem-solving

6.6 Describe common biases in making judgments and decisions

6.7 Recall some of the mental qualities that make a creative genius

6.5: Problem Solving

Objective: Evaluate strategies for and barriers to effective problem-solving

Sergey Brin and Larry Page can certainly be called effective problem solvers. Likewise, artists, inventors, Nobel prize winners, great presidents, successful business exec-

utives, world-class athletes, and high-achieving college students must be effective problem solvers. What strategies do they use? No matter what their field, most successful problem solvers share certain characteristics. They, of course, possess the requisite knowledge for solving the problems they face. In addition, they are skilled at:

(a) *Identifying the problem*
(b) *Selecting a strategy* to attack the problem

In this section, we will examine these two skills with the aid of some examples.

6.5.1: Identifying the Problem

A good problem solver learns to consider all relevant possibilities without leaping to conclusions prematurely. Suppose you are driving along the freeway and your car suddenly begins sputtering and then quits. As you coast to the shoulder, you notice the gas gauge says "empty." What do you do? Your action in this predicament depends on the problem you think you are solving. If you assume you are out of fuel, you may hike to the nearest service station for a gallon of gas. But you may be disappointed. By representing the problem as "out of gas," you may fail to notice a loose battery cable that interrupts the supply of electricity both to the spark plugs and to the gas gauge. The good problem solver considers all possibilities before committing to one solution.

6.5.2: Selecting a Strategy

The second ingredient of successful problem solving requires selecting a strategy that fits the problem at hand (Wickelgren, 1974). For simple problems, a trial-and-error approach will do—as when you search in the dark for the key to your front door. More difficult problems require more efficient methods. Problems in specialized fields, such as engineering or medicine, may require not only specialized knowledge but also special procedures or formulas known as *algorithms*. In addition, expert problem solvers have a repertoire of more intuitive, but less precise, strategies called *heuristics*. Let's look more closely at both of these methods.

Algorithms: Whether you are a psychology student or a rocket scientist, selecting the right algorithms will guarantee correct solutions for many of your problems. What are these never-fail strategies? *Algorithms* are nothing more than formulas or procedures, like those you learned in science and math classes. They can help you solve particular kinds of problems for which you have all the necessary information. For example, you can use

algorithms to balance your checkbook, figure your gas mileage, calculate your grade-point average, and make a call on your cell phone. If applied correctly, an algorithm always works because you merely follow a step-by-step procedure that leads directly from the problem to the solution.

Despite their usefulness, however, algorithms will not solve every problem you face. Problems involving subjective values or having too many unknowns (Will you be happier with a red car or a white car? Which is the best airline to take to Denver?) and problems that are just too complex for a formula (How can you get a promotion? What will the fish bite on today?) do not lend themselves to the use of algorithms. That is why we also need the more intuitive and flexible strategies called heuristics.

Heuristics: Everyone makes a collection of heuristics while going through life. Examples: "Don't keep bananas in the refrigerator." "If it doesn't work, see if it's plugged in." "Feed a cold and starve a fever" (or is it the other way around?). *Heuristics* are simple, basic rules—so-called rules of thumb that help us cut through the confusion of complicated situations. Unlike algorithms, heuristics do not guarantee a correct solution, but they often start us off in the right direction. Some heuristics require special knowledge, such as training in medicine or physics or psychology. Other heuristics, such as those you will learn in the following paragraphs, are more widely applicable—and well worth remembering.

6.5.3: Some Useful Heuristic Strategies

Here are three essential heuristics that should be in every problem solver's tool kit. They require no specialized knowledge, yet they can help in a wide variety of puzzling situations. The common element shared by all three involves approaching the problem from a different perspective.

WORKING BACKWARD Some problems, such as the maze seen in Figure 6.3, baffle us because they present so many possibilities we don't know where to start.

A good way to attack this sort of puzzle is by beginning at the end and *working backward*. (Who says we must always begin at the beginning?) This strategy can eliminate some of the dead ends we would otherwise encounter by trial and error.

In general, working backward offers an excellent strategy for problems in which the goal is clearly specified, such as mazes or certain math problems. In the larger world, police officers and investigators often work backward to solve crimes. By starting at the scene of the

Figure 6.3 Working Backward
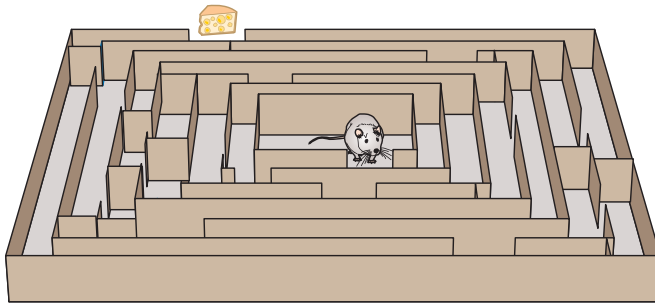
Mazes and math problems often lend themselves to the heuristic of working backward. Try solving this maze, as the mouse must do, by starting at what would normally be the finish (in the center) and working backward to the start.

crime—where the event "ended"—and gathering information based on evidence and witness statements, the potential pool of suspects is narrowed down considerably. With fingerprints and sketches of the assailant in hand, investigators can focus their efforts accordingly, working backward as they follow clues to the origin (Lesgold, 1988).

SEARCHING FOR ANALOGIES If a new problem is similar to one you have faced before, you may be able to employ a strategy you learned previously. The trick is to recognize the similarity, or *analogy,* between the new problem and the old one (Medin & Ross, 1992). For example, if you are an experienced cold-weather driver, you use this strategy to decide whether to install tire chains on a snowy day: "Is the snow as deep as it was last time I needed chains?" Analogies are often used in the business world: The notion of supermarkets—which began in the 1930s, taking the place of smaller specialty shops offering only one type of item such meat, baked goods, produce, or dry goods—prompted the development of Toys 'R Us in the 1950s, and subsequent other types of "superstores" for home improvement needs, office supplies, and more— all based on an innovative person seeing the potential similarity between the supermarket and their own idea (Gavetti & Rivkin, 2005).

Complex scientific problems may yield to this strategy as well: The cracking of the genetic code was assisted by the analogy of the DNA molecule being shaped like a spiral staircase, and Bell modeled his new-fangled telephone after the human ear. And a variety of inventions owe their origin to analogies, such as the creation of Velcro—which occurred after Swiss engineer George de Mestral investigated what made burrs stick on his dog's coat! In what ways have you used analogies to solve problems?

Analogies Help Solve Problems

Describe a time you used an analogy to solve a problem.

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

BREAKING A BIG PROBLEM INTO SMALLER PROBLEMS Are you facing a huge problem, such as an extensive term paper or a messy house? The best strategy may be to break the big problem into smaller, more manageable steps, often called *subgoals.* In writing a paper, for example, you might break the problem into the steps of selecting a topic, doing your library and Internet research, outlining the paper, writing the first draft, and revising the paper. In this way, you begin to organize the work and develop a plan for each part of the problem. Tackling the problem in a step-by-step fashion makes big problems seem more manageable. In fact, the Wright brothers deliberately used this heuristic to break down their problem of powered human flight into its components. By using a series of kites, gliders, and models, they studied the component problems of lift, stability, power, and directional control. Later, they put their discoveries together to solve the larger problem of powered human flight (Bradshaw, 1992).

6.5.4: Obstacles to Problem Solving

Having a good repertoire of strategies is essential to successful problem solving, but people often get stuck when they latch onto an ineffective strategy and won't let go. For this reason, problem solvers must learn to recognize obstacles that demand a new approach. Here are some of the most troublesome obstacles problem solvers face.

MENTAL SET Have you ever studied for a new class the same way you studied effectively for a previous class—but in the new class, your old study methods didn't work at all, and as a result you did poorly on an exam? If so, psychologists would say you had an inappropriate **mental set**. You "set" your mind on a strategy, but chose the wrong analogy, schema, or algorithm. Physicians always have to guard against jumping to a diagnostic conclusion based on diseases they commonly see in their patients—lest they miss a deadly but less

common disorder with similar symptoms. And the Wright brothers had to get past their mental set about wings (that wings must flap, as birds' wings do), in order to invent a functional airplane.

Mental set, of course, can be of tremendous help in problem-solving, because we learn successful strategies by experience—the problem is that we don't always choose the right strategy the first time around. To see mental set in action, try the demonstration in the *Do It Yourself!* box.

Do It Yourself!
Overcoming Mental Sets

Each of the groups of letters in the columns below is a common but scrambled word. See if you can unscramble them:

nelin	frsca	raspe	tnsai
ensce	peshe	klsta	epslo
sdlen	nitra	nolem	naoce
lecam	macre	dlsco	tesle
slfal	elwha	hsfle	maste
dlchi	ytpar	naorg	egran
neque	htmou	egsta	eltab

Most people, whether they realize it or not, eventually solve the scrambled word problem with an algorithm by rearranging the order of the letters in all the words in the same way, using the formula 3-4-5-2-1. Thus,

n e l i n	becomes	l i n e n
1 2 3 4 5		3 4 5 2 1

Notice, however, that by using that *algorithm*, your answers for the last two columns won't agree with the "correct" ones. The *mental* set you developed while working on the first two columns prevented you from seeing there is more than one answer for the last 14 items. The lesson of this demonstration is that a mental set can make you limit your options without realizing you have done so. While a mental set may produce results, you should occasionally stop to ask yourself whether you have slipped into a rut that prevents your seeing another answer. (Now, can you find some other possible answers to the scrambled words in the last two columns?)

linen	scarf	pears	stain
scene	sheep	talks	poles
lends	train	melon	canoe
camel	cream	colds	steel
falls	whale	shelf	meats
child	party	groan	anger
queen	mouth	gates	bleat

Unscrambled Words: The words you found to solve the scrambled word problem may not jibe with the ones listed here—especially the third and fourth columns. Most people, whether they are aware of it or not, develop an *algorithm* as

they work on the first two columns. While the formula will work on all the words, it becomes a *mental set* that interferes with the problem solver's ability to see alternative solutions for the words in the last two columns.

FUNCTIONAL FIXEDNESS   A special sort of mental set occurs when you think you need a screwdriver but don't realize you could tighten the bolt with a dime. Psychologists call this **functional fixedness**. Under this condition, the function of a familiar object becomes so set, or fixed, in your mind that you cannot see a new function for it. For example, you could use your coffeepot to cook ramen noodles, a Sharpie to cover up a scuff on your dress shoes, or a blow dryer to dry a wet pair of socks. One psychologist we know points out that you can even use an indoor fan to blow the leaves off your sidewalk. To illustrate, consider this classic problem:

> Your psychology professor has offered you $5 if you can tie together two strings dangling from the ceiling without pulling them down (see Figure 6.4). But when you stand between them and grab the end of one string, you find that you cannot quite reach the other string. The only objects available to you in the room are on the floor in the corner: a Ping-Pong ball, five screws, a screwdriver, a glass of water, and a paper bag. How can you reach both strings at once and tie them together?

Figure 6.4 The Two-String Problem

How could you tie the two strings together using only the objects found in the room?

You could use the screwdriver as a pendulum weight to swing one of the strings toward you. Did you figure it out, or did you get caught by functional fixedness with regard to the screwdriver?

SELF-IMPOSED LIMITATIONS   We can be our own worst enemies when we impose unnecessary limitations on ourselves. The classic nine-dot problem in Figure 6.5 illustrates this neatly. To solve it, you must connect all nine

Figure 6.5 The Nine-Dot Problem

Can you connect all nine dots with four connecting straight lines without lifting your pencil from the paper?

SOURCE: Adapted from Wickelgren, W. A. (1974). *Can you solve it? How to solve mathematical problems: elements of a theory of problems and problem solving*. San Francisco, CA: W. H. Freeman. Copyright © 1974 by W. H. Freeman and Company. Reprinted by permission of Dover Publications.
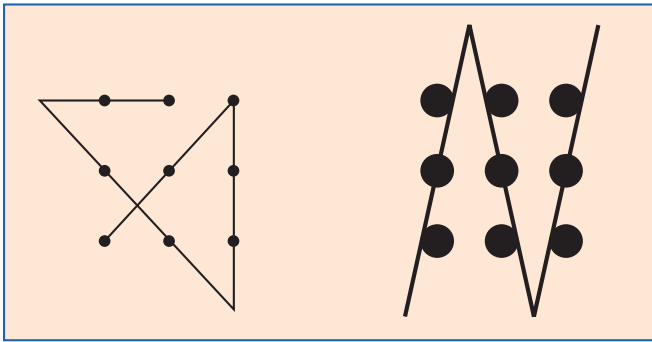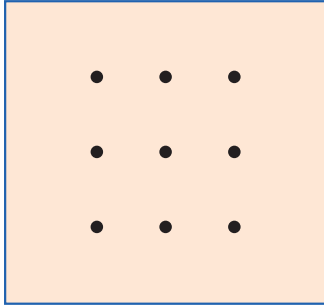
dots with no more than four connecting straight lines—and without lifting your pencil from the paper. The instructions allow you to cross a line, but you may not retrace a line. Try it a few times before you read the hint.

Translating this into personal terms, we find many instances in which people impose unnecessary restrictions on themselves. Students may assume that they have no talent for math or science—thereby eliminating the possibility of a technical career. Or because of gender stereotypes, a man may never consider he could be a nurse or a housekeeper, and a woman may assume she must be a flight attendant instead of a pilot. What real-life problems are you working on in which you have imposed unnecessary limitations on yourself?

WRITING PROMPT

Self-Imposed Limitations

Think for a moment about some goals or dreams you've had. Do you think you ever limited your possibilities due to self-imposed limitations? Discuss your thoughts about that.

▶   The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

OTHER OBSTACLES   There are many other obstacles to problem solving that we will simply mention rather than discuss in detail. These include lack of specific knowledge required by the problem, lack of interest, low self-esteem, fatigue, and drugs (even legal drugs such as cold medicines or sleeping pills). Arousal and its accompanying stress create another stumbling block for would-be problem solvers. Research in the field of emotion reveals that there is an optimum arousal level for any task, be it basketball, brain surgery, or bartending. Moderate levels of arousal actually facilitate everyday problem solving, but high stress levels can make complex problem solving impossible.

One of the most troublesome obstacles, however, is that we humans are thinkers who readily jump to conclusions, based on our knowledge but also biased by our knowledge—as well as our motives, emotions, and perceptions. In view of this, it is surprising that our thinking so often serves us well in day-to-day life. Yet, from another perspective it makes perfect sense; most of our problem-solving efforts draw on past experience to make predictions about future rewards or punishments. This, of course, is exactly what **operant conditioning** is all about—which suggests this mode of thinking is a fundamental part of our **nature**. Thus, many of the "flaws" in our reasoning abilities, such as mental sets, are actually adaptive (but necessarily imperfect) strategies that help us apply previous experience to solve new problems.

6.6: Judging and Making Decisions

Objective: Describe common biases in making judgments and decisions

Whether you are a corporate president, student, or professor, you make decisions every day. "How much should I invest?" "How much time do I need to study tonight?" "What grade does this paper deserve?" Each decision is the solution to a problem—for which there may not be a clear answer, but that instead requires judgment. Unfortunately, especially for those who have not studied the psychology of decision-making, judgment can be clouded by biases that interfere with critical thinking.

In his book *Thinking, Fast and Slow*, Nobel laureate Daniel Kahneman (2011) says that faulty decisions often stem from the two modes of thinking that operate simultaneously, but in separate pathways in our brains.

1. One involves our intuitive thought processes, which Kahneman calls *System 1.* Designed for quick decisions, System 1 probably meant the difference between life and death for our ancestors. It is also what most

people mean when they refer to "common sense." But it is the rush-to-judgment System 1 that relies most on biases, prejudices, and faulty heuristics.

2. The slower, more rational System 2 distinguishes us from the rest of the animal kingdom, and it is charged with taking conscious control over the more automatic System 1, especially in cases involving complex problems. Says Kahneman, "System 2 in part is a mechanism for second-guessing or controlling yourself" (Winerman, 2012). Incidentally, education mostly influences System 2. Let's look at a few of the errors to which System 1 is prone, especially when faced with complex problems.

6.6.1: Confirmation Bias

Suppose Tony has strong feelings about raising children: "Spare the rod and spoil the child," he says. How do you suppose Tony will react when his psychology professor says that punishment can actually encourage aggressive behavior? Chances are, **confirmation bias** will cause him to ignore or find fault with this information, while seeking and remembering information with which he agrees. He may tell tales of spoiled children who didn't get punishment for their transgressions or of upstanding adults, like himself, who owe their fine character to harsh discipline. A great deal of evidence shows that confirmation bias is a powerful and all-too-human tendency (Aronson, 2004; Nickerson, 1998). In fact, we all act like Tony sometimes, especially when we hold strong opinions.

6.6.2: Hindsight Bias

A politician says, "My opponent should have seen the economic downturn coming." You tell a friend that she should have known the guy she was dating was a jerk. Besides being an insensitive friend, you, like the politician, are guilty of the *hindsight bias*, sometimes called the "I-knew-it-all-along effect" (Fischhoff, 1975; Hawkins & Hastie, 1990). Just as guilty of hindsight bias are political pundits who talk after the fact about why everyone should have known who was or wasn't going to get elected. This form of distorted thinking appears after an event has occurred and people overestimate their ability to have predicted it. Examples in the news abounded after 9/11, after each crisis in the Middle East, and after violent events in local communities.

The problem with hindsight bias is that it impedes our ability to learn from our mistakes: After all, anytime we're sure we "knew it all along," we are ignoring an opportunity to improve our judgment next time by recognizing our errors this time. A recent study of international investment bankers found hindsight bias coloring bankers' recollections of their accuracy in predicting stock

prices—and the bankers most guilty of the bias also earned the fewest performance bonuses, indicating a correlation between a tendency for hindsight bias and for poor performance (Biais & Weber, 2009). In other words, being swayed by hindsight bias may increase our chances of repeating the same mistake.

6.6.3: Anchoring Bias

Ask a few of your friends, one at a time, to give a quick, off-the-top-of-the-head guess at the answer to the following simple math problem:

$$1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 = ?$$

Make them give you an estimate without actually doing the calculation; give them only about 5 seconds to think about it. Then, pose the problem in reverse to some other friends:

$$8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = ?$$

Are the results different for the two groups? What's your opinion?

Nobody will give precisely the right answer, of course, but it's likely that your friends will respond as volunteers did in Daniel Kahneman and Amos Tversky's (2000) experiment. It turns out the answers to such questions, where people usually don't have a good "ballpark" answer, depend on whether the problem begins with larger or smaller numbers. Those who saw the first problem gave a lower estimate than did those given the second problem. In Kahneman and Tversky's study, the average answer for the first group was 512, while the average for the second group was 2,250. Apparently, their "first impression"—larger or smaller numbers at the beginning of the problem—biased their responses. Incidentally, the correct answer to both problems (40,320) was larger than either group had imagined.

Kahneman and Tversky have explained the difference between the two groups on the basis of an *anchoring bias*; that is, people apparently use this flawed heuristic to "anchor" their thinking to the higher or lower numbers that appear at the beginning of the problem. The anchoring bias can affect our real-world decisions, as those who sell automobiles and real estate know well: What we ultimately decide to pay for a car or a house depends on the price and condition of the first item we are shown: If the salesperson shows us something with an expensive price tag that is out of our range, it will still serve as the "anchor" from which we see other options—and, thus, anything lower-priced will seem like a bargain. And the anchoring bias isn't just limited to numbers or amounts of money: Any characteristic or element of a decision can serve as the anchor from which you judge your options. A person whose same-sex parent never did any housework may feel like they are doing a lot if they vacuum once a week (but don't do anything else),

whereas that person's roommate may have higher expectations for household division of labor.

6.6.4: Representativeness Bias

If you assume tall men play basketball or ministers are prudish or artists must be slightly disturbed, your judgment is clouded by representativeness bias. Why do people succumb to such prejudices? Mere convenience: In other words, the **representativeness bias** simplifies the task of social judgment. Once something is "categorized," it shares all the features of other members in that category. The fallacy in this heuristic, of course, is that people, events, and objects do not "belong" to categories simply because we find it mentally convenient to give them labels. By relying on category memberships to organize our experiences, we risk ignoring or underestimating the tremendous diversity of individual cases and complexity of people.

When estimating the likelihood that a specific individual belongs to a certain category—"vegetarian," for example—we look to see whether the person possesses features found in a typical category member. For example, is your new acquaintance, Holly, a vegetarian? Does she resemble your prototype of a "typical" vegetarian? Perhaps you believe most vegetarians wear sandals, ride bicycles, and support liberal social causes. If so, you might judge that Holly represents enough of the characteristics of your concept of "vegetarians" to belong to the same group.

But such an analysis is not entirely reasonable. Although some—perhaps many—vegetarians wear sandals, ride bicycles, and hold liberal views, the opposite may not be true: Because vegetarians are a minority group in the general population, it is unlikely that any particular individual who supports liberal social causes, wears sandals, and rides a bicycle is also vegetarian. That is, by ignoring the **base rate information** you have drawn an erroneous conclusion. While your representativeness bias—judging Holly by what seems to be her "type"—may not have dire consequences, the same error underlies the more serious stereotypes and prejudices that result when people classify others solely on the basis of membership in racial, sexual orientation, ethnic, or gender-based groups.

6.6.5: Availability Bias

Which is riskier: traveling by car or by plane? Statistically, you are far more likely to be killed in an auto accident than in a plane crash, and most of us know this in our rational brains. Yet, why do we fear flying more than driving? The **availability bias** reflects our tendency to judge probabilities of events by how readily examples come to mind, and media coverage of plane crashes takes center stage with its vivid images—even though you are far more likely to die crossing the street than in a plane crash (Bailey, 2006). The same bias makes some people more wary of a shark bite than a dog bite, and more afraid of a terrorist attack than a heart attack. Similarly, people who watch a lot of violent crime on television judge their chances of being murdered or mugged as being much higher than do people who watch little television (Singer and others, 1984). Anytime a vivid image of something comes easily to mind, it carries with it the risk we will overestimate its frequency.

6.6.6: The Tyranny of Choice

Not all decision problems stem from faulty heuristics; they can also come from outside factors. To illustrate: Have you ever had trouble deciding among a bewildering array of choices—perhaps in buying a car, a computer, or even a tube of toothpaste? Too many choices can interfere with effective decision-making, sometimes to the point of immobilizing us. For example, when Sheena Sethi-Iyengar and her colleagues (2004) studied the choices employees made concerning matching contributions to retirement funds, they found that too many alternatives could, in effect, make people throw away free money. When employers offered to match employees' contributions and give them only two alternatives, 75% elected to participate. But if allowed to select among 59 possibilities, the participation rate fell to 60%.

Apparently, some people just gave up. Psychologist Schwartz and Ward (2004) calls this the **tyranny of choice**. Schwartz says the tyranny of choice can create stress, especially for those who feel compelled to make the "correct" decision or get the very "best buy." The antidote, he says, is "satisficing" rather than "maximizing." Satisficers, says Schwartz, scan their options until they find one that is merely "good enough," while maximizers stress themselves out by trying to make certain they have made the very best choice—perhaps getting caught in "analysis paralysis" and not making a decision at all.

Shoppers face the tyranny of choice when they must decide among similar products. Psychologist Barry Schwartz suggests quickly settling on one that is "good enough" rather than wasting time on "maximizing" a choice of little importance.

6.6.7: Decision-Making and Critical Thinking

Much of the foregoing discussion should have a familiar ring, because it involves critical thinking. Accordingly, we can now add a few more items to the list of critical-thinking skills we discussed in previous chapters. The critical thinker should know how to identify a problem, select a strategy, and apply the most common algorithms and heuristic strategies. Critical thinkers also know about the various biases common in judgment and decision-making and work to overcome them. All these skills can help you take your thinking to the next level: to become an expert—or even a creative genius.

6.7: Becoming a Creative Genius

Objective: Recall some of the mental qualities that make a creative genius

Everyone would agree that Einstein was a creative genius. So were Aristotle and Bach. And we can make a case that Brin and Page, the Google guys, are geniuses, too. But what about your Aunt Elisa, who does beautiful watercolors? Such questions illustrate the big problem in creativity research: Experts cannot agree on an exact definition of creativity. Most, however, would go along with the slightly fuzzy notion that *creativity* is a process that
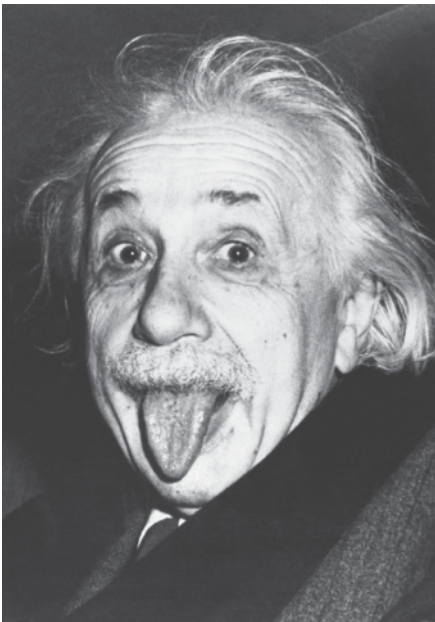
Albert Einstein was bright. He also had an independent streak, a sense of humor, an intense interest in a complex problem (gravity), willingness to restructure the problem, and sought the stimulation of other physicists. But his thought *processes* were likely not that different from anyone else's.

produces novel responses to the solutions of problems. Most would also agree that a "genius" is someone whose insight and creativity are greater than those of ordinary folk. As with the idea of creativity, the boundary for genius is not well defined.

Let's follow the lead of psychologist Robert Weisberg, whose view of "genius" departs from the commonly held assumption that geniuses are completely different from the rest of us. In brief, he argues that geniuses are merely good problem solvers who also possess certain helpful—but entirely human—characteristics.

6.7.1: A Genius Is Not Superhuman

Here's how Weisberg (1986) characterized most people's assumptions about the quality we call "genius":

> Our society holds a very romantic view about the origins of creative achievements. . . . This is the genius view, and at its core is the belief that creative achievements come about through great leaps of imagination which occur because creative individuals are capable of extraordinary thought processes. In addition to their intellectual capacities, creative individuals are assumed to possess extraordinary personality characteristics which also play a role in bringing about creative leaps. These intellectual and personality characteristics are what is called "genius," and they are brought forth as the explanation for great creative achievements (p. 1).

But, according to Weisberg and some other scholars in this area (Bink & Marsh, 2000), there is surprisingly little evidence supporting this view. In fact, the notion that creative geniuses are a breed apart may actually discourage creativity by making people feel that real creativity lies out of their reach. A more productive view, suggests Weisberg, portrays the thinking of people we call geniuses as "ordinary thought processes in ordinary individuals" (p. 11). What produces extraordinary creativity, he says, is extensive knowledge, high motivation, and certain personality characteristics—not superhuman talents.

6.7.2: Knowledge and Understanding

Everyone agrees with Weisberg on one point: The most highly creative individuals have *expertise* or highly developed knowledge in their fields (Ericsson and others, 2006). In fact, you cannot become highly creative without first becoming an **expert**: having extensive and organized knowledge of the field in which you will make your creative contribution. But such mastery is not easily achieved,

because it requires a strong and persistent level of motivation to sustain years of intense training and practice. Studies indicate that about 10 years of work, or 10,000 hours, are required to become fully competent in virtually any field, whether it be skiing, sculpture, singing, or psychology (Ericsson and others, 1993; Gladwell, 2008). Oh, yes, and this rule also applies to the field of computing, as in the case of Google founders Brin and Page. Meanwhile, such factors as time pressures or an overly critical supervisor, teacher, or parent can suppress the creative flow (Amabile and others, 2002).

6.7.3: Aptitudes, Personality Characteristics, and Creativity

In opposition to Weisberg, psychologist Howard Gardner (1993) argues that the extraordinary creativity we see in the work of Freud, Einstein, Picasso, and others results not only from expertise and motivation but also from certain patterns of abilities and personality characteristics. Highly creative individuals, he says, have **aptitudes** specific to certain domains. (These potentialities, of course, must be developed by intensive study and practice.) Freud, for example, had a special facility for creating with words and understanding people; Einstein was remarkably good at logic and spatial relationships; and Picasso's creativity arose from a combination of aptitudes comprising spatial relationships and interpersonal perceptiveness.

In addition to special aptitudes, creative people usually possess a common cluster of personality traits, including the following (Barron & Harrington, 1981; Csikszentmihalyi, 1998):

Figure 6.6 Characteristics of Creative People

Independence
Highly creative people can resist social pressures to conform to conventional ways of thinking, at least in their area of creative interest (Amabile, 1983, 1987; Sternberg, 2001). That is, they have the confidence to strike out on their own. Because of this, perhaps, some creative people describe themselves as loners.

Intense interest in a problem
Highly creative individuals must also have an all-consuming interest in their creative subject matter (Amabile, 2001), always tinkering, often just in their minds, with problems that fascinate them (Weisberg, 1986). External motivators, such as money or a Nobel prize, may be attractive, but their main motivators are internal. Otherwise they could not sustain the long-term interest necessary for a highly original contribution.

Figure 6.6 (*Continued*)

Willingness to restructure the problem
Creative people not only grapple with problems but often question the way a problem is presented (Sternberg, 2001). (Recall our earlier discussion about identifying the problem.) For example, students from the School of the Art Institute of Chicago who later became the most successful artists among their class members had one striking characteristic in common: They were always changing and redefining the assignments given by their instructors (Getzels & Csikszentmihalyi, 1976).

Preference for complexity
Creative people seem drawn to complexity—to what may appear messy or chaotic to others. Moreover, they revel in the challenge of looking for simplicity in complexity. Thus, highly creative people may be attracted to the largest, most difficult, and most complex problems in their fields (Sternberg & Lubart, 1991).

A need for stimulating interaction
Creativity of the highest order almost always grows out of an interaction of highly creative individuals. Early in their careers, creative people usually find a mentor—a teacher who brings them up to speed in their chosen field. Highly creative individuals may surpass their mentors and then seek additional stimulation from others like themselves. Often, this means leaving behind family and former friends (Gardner, 1993).

WRITING PROMPT

Reflecting on Creativity

As you consider what you've learned here about creativity, what surprises you, and why?

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

What is the take-home message? Those who have looked closely at creativity agree on two main points.

1. First, creativity requires well-developed knowledge—often growing out of aptitudes—in the field in which the creative contribution will be made.
2. Second, high-level creativity requires certain personal characteristics, such as independence, a preference for complexity, and motivation to sustain an interest over a very long period of time.

This combination of qualities, then, may be your formula for becoming a creative genius.

ARE CREATIVE PEOPLE A LITTLE WEIRD?   Albert Einstein would pick up cigarette butts off the street and strip the tobacco for his pipe; aviation pioneer Howard Hughes became immobilized by a fear of germs; and composer Robert Schumann believed that Beethoven dictated compositions to him from the grave (Carson, 2011). The idea that creativity and eccentricity go together has been around for a long time. Studies, in fact, confirm that mental disorders, especially mood disorders such as depression, are more common among highly creative people (Andreasen, 2008; Kaufman & Sternberg, 2010).

What are we to make of this apparent creativity–weirdness connection? Harvard psychologist Shelley Carson (2011) notes that creative people tend to score high on measures of **schizotypal personality**. People with schizotypal personalities, she is quick to add, do not have a mental disorder—but they *are* eccentric. Many engage in "magical thinking," such as belief in the paranormal; they may dress or speak unconventionally; they may be difficult to have as friends; and people may describe them as odd. But, Carson's research suggests that schizotypal traits do not *make* people creative (nor are all creative people schizotypal). Rather, she believes, there is a common factor that underlies both traits: schizotypal personality and creativity. That common factor, she theorizes, is **cognitive disinhibition**. In other words, they think outside the box, letting their minds consider whatever oddball possibilities might emerge, instead of immediately rejecting the ones that don't traditionally fit. While this might seem like an invitation to "information overload," it may not be so much of a problem for highly intelligent individuals with greater-than-average capacities in working memory. Indeed, that is what Carson has found (2011).

We don't want this to become a self-fulfilling prophecy for you, however—especially if you're worried that you are not weird enough to be creative. Please rest assured that not all creative people are considered odd or eccentric. Nor, unfortunately, is the inverse necessarily true: Neither "weird" people nor those with mental disorders are always creative (Kaufman & Sternberg, 2010). The take-away message should be this: There are many distinctly different—but not necessarily "abnormal"—ways to be a creative person.

6.7.4: The Role of Intelligence in Creativity

Is a high IQ necessary for creativity or genius? The answer is a bit complicated. Low intelligence inhibits creativity—although we will see there are some special cases, known as *savants,* who may have a highly developed skill despite their mental handicaps. On the other end of the IQ spectrum, we find that having high intelligence does not necessarily induce creativity: There are lots of very bright people who never create anything that could be called groundbreaking or highly original and insightful. Thus, intelligence and

creativity are (somewhat) distinct abilities. We can find plodding, unimaginative persons at all IQ levels, and we can find highly creative persons with only average IQ scores.

Robert Sternberg (2001) argues that creativity lies a step beyond IQ. In his view, creativity requires a decision to go against the expectations of the crowd. This makes creativity potentially achievable for nearly any of us who chooses to adopt a creative attitude. Most people will not do so, he says, for a variety of reasons, including an unwillingness to take the necessary risks.

Psychology Matters

Using Psychology to Learn Psychology

Obviously, *experts* are people who know a lot about a particular subject. Unlike a novice, an expert confronting a problem does not have to start from scratch. Experts often see a solution quickly because they have seen many similar problems before; that is, they are especially good at finding analogies.

Their secret lies in the way their knowledge is organized (Ericsson and others, 2006; Ross, 2006). Characteristically, the novice possesses knowledge that is both limited and unorganized, while experts have extensive knowledge organized into elaborate "chunks" and schemas. We can see this quite clearly in a famous study of world-class chess players.

A Study of Chess Experts

Dutch psychologist Adriaan de Groot found some striking differences when he compared how well a group of grand master chess players and another group of merely "good" players could remember a chess problem. When allowed 5 seconds to view a configuration of pieces as they might appear on a chessboard during a match, grand masters could reproduce the pattern far more accurately than those with less proficiency (de Groot, 1965). Does that mean the grand masters had better visual memories? No. When confronted with a random pattern of pieces on the chess board—a pattern that would never happen in a match—grand masters did no better than the others. This suggests the experts were better able to draw on familiar patterns in memory (schemas, really), rather than trying to recall individual pieces and positions.

Figure 6.7 Schemas and Memory

Expertise as Organized Knowledge

How do experts organize their knowledge? There is no easy formula. Through study and practice, they develop both a fund of knowledge to apply to a problem and a familiarity with the field's common problems and solutions. In other words, they know not only the facts but also how the facts are interrelated and used (Bédard & Chi, 1992). Aside from facts and specific skills they must learn, would-be experts must also acquire a repertoire of heuristics, or "tricks of the trade," unique to their field of expertise. These heuristics help them find solutions more quickly, without having to follow so many blind leads (Gentner & Stevens, 1983; Simon, 1992). In a very real sense, expert knowledge is so well integrated that it becomes part of intuition—part of Kahneman's System 1 (Kahneman & Klein, 2009).

Practice Versus Talent

Are experts born, or is expertise learned? The highest levels of skilled performance requiring speed and accuracy of movement, as in athletics or music, seems to depend, in part, on native ability (Ackerman, 2007; Simonton, 2001). In contrast, expertise in a field requiring the mastery of a body of knowledge (think psychology, medicine, or medieval literature) requires considerable academic study. There is evidence that people have differing aptitudes for performing at the highest levels in any given field, but it is impossible to predict in advance who has the requisite ability for a particular endeavor. At this point, the important variables seem to be motivation and practice—much as we saw with creativity (Ericsson & Charness, 1994).

For now, especially if you are at the beginning of your college career, the best advice is to explore as many fields as you can to find out where your passions lie. Find something you have some natural talent for that you also really enjoy. You are much more likely to work long and hard, and eventually develop true expertise, on something you love.

So, How Do You Become an Expert?

A supportive environment, with good teachers and mentors, helps (Barab & Plucker, 2002). Beyond that, it's study and practice! But don't just focus on the details. Learn the important schemas and problem-solving strategies in your chosen field, too.

What does this suggest for your learning of psychology and other disciplines? You can take the first steps in developing your expertise in any subject by attending to the way your professor and your text organize the information they present (Gonzalvo and others, 1994). Consider such questions as the following:

- What terms does your psychology professor mention over and over? These might be such concepts as "cognitive science," "behaviorism," "developmental," or "theoretical perspectives." For you they may be, at first, unfamiliar and abstract, but for the professor they may represent the core of the course. Make sure you know what they mean and why they are important.
- What concepts does the course syllabus emphasize? What terms are associated with the main topics?

- Around what concepts is the textbook organized? You may be able to discern this quickly by looking at the table of contents. Alternatively, authors may lay out the organizing points in the preface. (In this book, we have attempted to help you identify the organizing principles of each chapter in the form of Core Concepts.)

Identifying the organizing principles for the course will simplify your studying. Long-term memory is organized by meaningful associations. Accordingly, when you have a simple and effective way of organizing material, you create a framework to help you store and retain it in long-term memory.

Key Question: How Is Intelligence Measured?

Core Concept 6.3

Intelligence testing has a history of controversy, but most psychologists now view intelligence as a normally distributed trait that can be measured by performance on a variety of cognitive tasks.

Psychologists have long been fascinated by the ways in which people differ in their abilities to reason, solve problems, and think creatively. The assessment of individual differences, however, did not begin with modern psychology. Historical records show that sophisticated mental testing methods were used in ancient China. More than 2,000 years ago, the Chinese employed a program of civil service testing that required government officials to demonstrate their competence every third year at an oral examination. Later, applicants were required to pass written civil service tests to assess their knowledge of law, the military, agriculture, and geography. British diplomats and missionaries assigned to China in the early 1800s described the selection procedures so admiringly that the British, and later the Americans, adopted modified versions of China's system for the selection of civil service personnel (Wiggins, 1973).

Unlike the historical Chinese, however, modern Americans seem to be more interested in how "smart" people are, as opposed to how much they have learned. It is interest in this sort of "native ability" that spurred development of intelligence testing as we know it today. But, despite the long history of mental testing and the widespread use of intelligence tests in our society, the exact meaning of the term *intelligence* is still disputed (Neisser and others, 1996). Still, most psychologists would probably agree with this general definition—that **intelligence** is the mental capacity to acquire knowledge, reason, and solve problems effectively. They would also agree that a complete picture of an individual's intelligence must be obtained from measurements across a variety of tasks. They disagree, however, on exactly what mental abilities constitute intelligence and whether they are many or few in number.

Everyone does acknowledge that intelligence is a relative term; that is, an individual's level of intelligence must be defined in relation to the same abilities in a comparison group, usually of the same age range. Everyone also agrees that intelligence is a *hypothetical construct:* a characteristic that is not directly observable but must be inferred from behavior. In practice, this means that intelligence is measured from an individual's responses on an intelligence test. The individual's scores are then compared to those of a reference group. Exactly what these tests should assess is the source of much controversy. Consider the focus of the core concept:

> Intelligence testing has a history of controversy, but most psychologists now view intelligence as a normally distributed trait that can be measured by performance on a variety of cognitive tasks.

We begin our survey of intelligence and intelligence testing by introducing you to the founders of intelligence testing.

By the end of this section, you will be able to:

6.8   **Identify the four important features that characterize the Binet-Simon approach**

6.9   **Discuss the development of the modern concept and measurement of IQ**

6.8: Binet and Simon Invent a School Abilities Test

Objective: **Identify the four important features that characterize the Binet-Simon approach**

Alfred Binet *(Bi-NAY)* and his colleague Théodore Simon stepped into history in 1904. At that time, a new law required all French children to attend school, and the government needed a means of identifying those who needed remedial help. Binet and Simon were asked to design a test for this purpose. They responded with 30 problems sampling a variety of abilities necessary for school (see Figure 6.8). The new approach was a success: It did, indeed, predict which children could or could not handle normal schoolwork.

Four important features distinguish the Binet-Simon approach (Binet, 1911):

1. They interpreted scores on their test as an estimate of current performance and not as a measure of innate intelligence.

2. They wanted test scores used to identify children who needed special help, not merely to categorize or label them as bright or dull.

Figure 6.8 Sample Items from the First Binet-Simon Test

On the original Binet-Simon test, a child was asked to perform tasks such as the following:

- Name various common objects (such as a clock or a cat) shown in pictures.
- Repeat a 15-word sentence given by the examiner.
- Give a word that rhymes with one given by the examiner.
- Imitate gestures (such as pointing to an object).
- Comply with simple commands (such as moving a block from one location to another).
- Explain the differences between two common objects.
- Use three words (given by the examiner) in a sentence.
- Define abstract terms (such as "friendship").

3. They emphasized that training and opportunity could affect intelligence and wanted to pinpoint areas of performance in which special education could help certain children identified by their test.

4. They constructed the test *empirically*—based on how children were observed to perform—rather than tying the test to a particular theory of intelligence.

Binet and Simon assessed French children of various ages with this test and first computed an average score for children at each age. Then, they compared each child's performance to the averages for children of various ages. The result of that comparison yielded a score for each individual child, expressed in terms of **mental age (MA)**. So, for example, when a child's score was the same as the average score for a group of 5-year-olds, the child was said to have a mental age of 5, regardless of his or her **chronological age (CA)**. Binet and Simon determined that students most needing remedial help were those whose MA was 2 years behind their CA.

6.9: American Psychologists Borrow Binet and Simon's Idea

Objective: **Discuss the development of the modern concept and measurement of IQ**

Less than a decade after the French began testing school children, American psychologists imported the Binet-Simon test of school abilities and changed it into the form we now call the *IQ test.* They did this by modifying the scoring procedure, expanding the test's content, and obtaining scores from a large normative group of people, including adults, to create comparison levels for scores. Soon "intelligence

testing" was widely accepted as a technique by which Americans were defining themselves—and each other.

6.9.1: The Appeal of Intelligence Testing in America

Why did intelligence tests become so popular in the United States? Three forces changing the face of the country in the early 20th century conspired to make intelligence testing seem like an orderly way out of turmoil and uncertainty.

1. First, the United States was experiencing an unprecedented wave of immigration resulting from global economic, social, and political crises.
2. Second, new laws requiring universal education—schooling for all children—were flooding schools with students.
3. And third, when World War I began, the military needed a way of assessing and classifying new recruits.

Together, these events created a need to assess large numbers of people (Chapman, 1988). Intelligence was seen not only as a means of bringing order to the turbulence of rapid social change but also as an inexpensive and democratic way to separate those who could benefit from education or military leadership training from those who could not.

One consequence of the large-scale group-testing program in America was that the public came to accept the idea that intelligence tests could accurately differentiate people in terms of their mental abilities. This acceptance soon led to widespread use of tests in schools and industry. Another, more unfortunate, consequence was that the tests reinforced prevailing prejudices. Specifically, Army reports suggested that differences in test scores were linked to race and country of origin (Yerkes, 1921). Of course, the same statistics could have been used to demonstrate that environmental disadvantages limit the full development of people's intellectual abilities. Instead, immigrants with limited facility in English (the only language in which the tests were given) or even little understanding of how to take such tests were labeled as "morons," "idiots," and "imbeciles" (terms used at the time to specify different degrees of mental impairment).

While these problems are obvious to us now (with the help of **hindsight bias**!), at the time they were obscured by the fact that the tests accomplished what most people wanted: They were simple to administer and provided a means of assessing and classifying people according to their scores. As a result, the public generally perceived the tests as objective and fair.

6.9.2: The Stanford-Binet Intelligence Scale

The most respected of the new American tests of intelligence came from the laboratory of Stanford University professor Lewis Terman. He adapted the Binet-Simon test for U.S. school children by standardizing its administration and its age-level norms. The result was the Stanford-Binet Intelligence Scale (Terman, 1916), which soon became the standard by which other measures of intelligence were judged. Because it had to be administered individually, Terman's test was less economical than the group tests. Nevertheless, it was better suited for spotting learning problems. Even more importantly, the Stanford-Binet test was designed both for children and adults.

With his new test, Terman introduced the **intelligence quotient (IQ)**, a concept originally developed by German psychologist William Stern in 1914. The IQ was the ratio of mental age (MA) to chronological age (CA), multiplied by 100 (to eliminate decimals):

$$IQ = \frac{\text{Mental Age}}{\text{Chronological Age}} \times 100$$

Please follow us through the IQ equation with these examples: Consider a child with a chronological age of 8 years, whose test scores reveal a mental age of 10. Dividing the child's mental age by chronological age (MA/CA = 10/8) gives 1.25. Multiplying that result by 100, we obtain an IQ of 125. In contrast, another 8-year-old child who performs at the level of an average 6-year-old (MA = 6) has an IQ of $6/8 \times 100 = 75$, according to Terman's formula. Those whose mental age is the same as their chronological age have IQs of 100, which is considered to be the average or "normal" IQ.

Within a short time, the new Stanford-Binet test became a popular instrument in clinical psychology, psychiatry, and educational counseling. With the publication of his test, Terman also promoted his belief that intelligence is largely innate and measurable. The message, then, was that an IQ score reflected something fundamental and unchanging about people.

Although the Stanford-Binet became the "gold standard" of intelligence testing, it had its critics. The loudest objection was that it employed an inconsistent concept of intelligence because it measured different mental abilities at different ages. For example, 2- to 4-year-olds were tested on their ability to manipulate objects, whereas adults were tested almost exclusively on verbal items. Test makers heeded these criticisms, and, as the scientific understanding of intelligence increased, psychologists found it increasingly important to measure multiple intellectual abilities at all age levels. A modern revision of the Stanford-Binet now provides separate scores for several mental skills.

6.9.3: Problems With the IQ Formula

An inherent problem in calculating IQ scores became apparent as soon as psychologists began to use their formula with adults. Here's what happens: By the mid- to late teenage years, gains in mental age scores usually level off as people develop mentally in many different directions. Consequently, mental

growth, as measured by a test, appears to slow down. As a result, Terman's formula for computing IQs makes normal children appear to become adults with mental deficiencies—at least as far as their test scores are concerned! Note what happens to the average 30-year-old's score if mental age, as measured by a test, stays at the same level as it was at age 15:

$$IQ = \frac{\text{Mental Age}}{\text{Chronological Age}} = \frac{15}{30} \times 100 = 50$$

Psychologists quickly realized this paints an erroneous picture of adult mental abilities. People do not grow less intelligent as they become adults (although their children sometimes think so). Prudently, psychologists decided to abandon the original IQ formula and seek another means of calculating IQs. Their solution was similar to the familiar practice of "grading on the curve." This famous curve demands some explanation.

6.9.4: Calculating IQs "On the Curve"

Behind the new method for calculating IQ lay the assumption that intelligence is normally distributed. In other words, intelligence is assumed to be spread through the population in varying degrees so that only a few people fall into the high or low ranges, while most cluster around a central average. In this respect, intelligence is presumed to be like many physical traits, including height, weight, and shoe size (See Figure 6.9). If you were to measure any of these variables in a large number of people, you would probably get a set of scores that follow the same "curve" teachers use when they grade "on the curve."

More precisely, when IQ tests are given to large numbers of individuals, the scores of those at each age level are normally distributed. (Adults are placed in a group of their own, regardless of age, and the distribution of their scores also fits the bell-shaped curve.) Instead of using the old IQ formula, IQs are now determined from tables that indicate where test scores fall on the normal curve. The scores are statistically adjusted so the average for each age group is set at 100. Scores near the middle of the distribution (usually between 90 and 110) are considered to be in the **normal range** (see Figure 6.7). At the extreme ends of the distribution, scores below 70 are often said to be in the **intellectual disability** range while those above 130 are sometimes said to indicate **giftedness**. Study Figure 6.9 for a few moments to better understand this concept.

Figure 6.9 Understanding the Concept of Normal Distribution
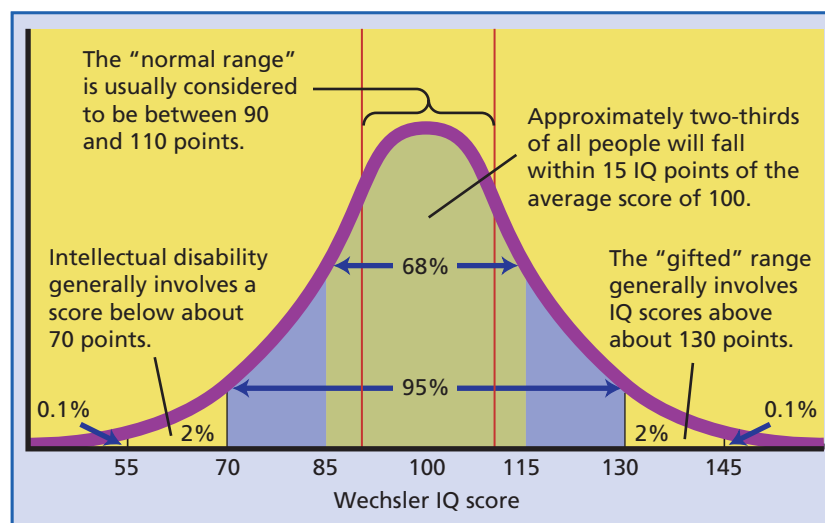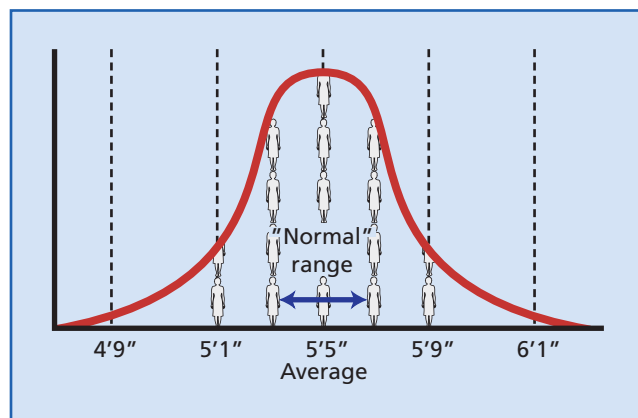
Thus, IQ scores are no longer calculated by dividing mental age by chronological age. The concept of a ratio expressed as a multiple of 100 (a percentage-like number that is easy to understand) is retained, even though the final score is calculated "on the curve." This solves the problem of spuriously declining adult IQs simply by comparing adults with adults.

Another important fact to realize is that experts do not believe that a single IQ score represents a person's intelligence as accurately as a composite measure of different cognitive abilities would do (Nisbett and others, 2012). Thus, most modern intelligence tests give scores reflecting at least two dimensions—typically a verbal (vocabulary) score and a score for abstract reasoning.

WRITING PROMPT

Grading "On the Curve"

Now that you know what "the normal curve" refers to, would you want your instructors to grade you on the curve? Why or why not?

▶ | The response entered here will appear in the performance dashboard and can be viewed by your instructor.

[SUBMIT]

THE FLYNN EFFECT Several decades ago, researcher James Flynn noticed the average IQ score had gradually increased, at the rate of about 3 points per decade, ever since the tests were invented—a fact that had been obscured by "renorming" the tests every few years to keep the average IQ at 100 (Flynn, 1987). Did that indicate that, over time, we are getting smarter? If taken at face value, this *Flynn effect* would mean that a person in the average range in your great-grandparents' time might be considered to have an intellectual disability today! Flynn, along with most other observers, believes such a conclusion is absurd (Flynn, 2003; Neisser and others, 1996). What, then, explains the Flynn effect?

The gradual increase probably results from a combination of factors, including better test-taking skills, greater complexity and mental stimulation in society (everything from movies to games to computers to cell phones), more schooling, and better nutrition. Flynn (2007) himself points out that different components of intelligence have accelerated at different rates (with vocabulary, for example, hardly budging at all), so part of the IQ gain can be explained by societies valuing and encouraging factors that contribute to intelligence. For example, one question asks, "How are a dog and a rabbit alike?" A century ago, says Flynn, the answer would have been culture-specific: "You use dogs to hunt rabbits." Now, he notes, the correct answer would be "They are both mammals," reflecting different ways of thinking. Flynn believes that rising IQ test scores are an artifact of the educational system of the 20th century, which

taught children to think more logically and scientifically— and then awarded them IQ points for it (Shea, 2012)!

The Flynn effect, however, may be slowing down, at least in developed countries. Since the mid-1990s, test scores in European samples have stabilized and in some cases even declined somewhat (Teasdale & Owen, 2008). In less developed countries, however, IQ scores continue to increase (Colom and others, 2007; Daley and others, 2003). At the same time, close examination of the Flynn effect since its beginning indicates the average rise in IQ score is largely a result of significant increases in the lower-end scores—but little or no increase in the upper range of scores (Dutton & Lynn, 2013; Teasdale & Owen, 1987). Putting all these findings together leads some theorists to suggest the Flynn effect may really be a mark of better equality in access to education, nutrition, and cognitive stimulation. If that is true, we may also see a narrowing of the IQ gap between developed and developing countries in the decades to come.

6.9.5: IQ Testing Today

The success of the Stanford-Binet test encouraged development of other IQ tests. As a result, psychologists can now choose from a wide array of instruments for measuring intelligence. The most prominent of these alternatives are the Wechsler Adult Intelligence Scale (WAIS), the Wechsler Intelligence Scale for Children (WISC), and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI). With these instruments, psychologist David Wechsler offers a family of tests that measures many skills presumed to be components of intelligence, including vocabulary, verbal comprehension, arithmetic ability, similarities (the ability to state how two things are alike), digit span (repeating a series of digits after the examiner), and block design (the ability to reproduce designs by fitting together blocks with colored sides). As our Core Concept noted, these tests measure intelligence by assessing performance on a variety of tasks.

Like the Stanford-Binet, the Wechsler tests are *individual* tests; that is, they are given to one person at a time. Also available are *group* tests of intelligence that can be administered to large numbers of students simultaneously. Unlike the Stanford-Binet and Wechsler tests, group tests consist of paper-and-pencil measures, involving booklets of questions and machine-scored answer sheets. The convenience of group tests—although not as precise as individual tests—has made IQ testing, along with other forms of academic assessment, widespread. It is quite likely you have taken such tests several times as you passed through grades 1 to 12, perhaps without realizing what they were. The items in the *Do It Yourself!* box are similar to items in many of these commonly used group tests of mental abilities.

Do It Yourself!
Sample IQ Test Items

Try your hand at the following items adapted from group tests of intelligence. Some of the items are more challenging than others. You will find the correct answers at the end.

VOCABULARY: Select the best definition for each word:

1. viable
 a. traveled
 b. capable of living
 c. V-shaped
 d. can be bent

5. imminent
 a. defenseless
 b. expensive
 c. impending
 d. notorious

ANALOGIES: Examine the relationship between the first two words. Then, find an answer that has the same relationship with the word in bold letters:

5. Washington: Lincoln
 July:
 a. January
 b. April
 c. May
 d. October

5. ocean: canoe
 verse:
 a. poem
 b. pen
 c. water
 d. serve

SIMILARITIES: Which letter on the right belongs to the same category as the one on the left?

5. J A M S Z T

6. A S D U V X

SEQUENCES: Choose the answer that best completes the sequence:

7. a z b y c x d?
 e s u w f

8. 1 3 6 10 15?
 16 18 21 27 128

MATHEMATICAL REASONING

9. Portland and Seattle are actually 150 miles apart, but on a map they are 2 inches apart. If Chicago and Norfolk are 5 inches apart on the same map, what is the actual distance between those two cities?
 a. 125 miles
 b. 250 miles
 c. 375 miles
 d. 525 miles

Answers 1. b **2.** c **3.** d (October comes after July) **4.** d (verse and serve have the same letters) **5.** S (the only one with a curve in it) **6.** U (the only vowel) **7.** W **8.** 21 **9.** C

What are IQ tests used for today?

How do IQ scores help predict school performance, career success, or delinquency?

IQ scores, then, do have some ability to predict academic and certain other aspects of success. Beyond that, an IQ score assumes almost overwhelming importance in determining whether a child has an "intellectual disability" or is "gifted"—concepts we will examine more closely in the next Psychology Matters feature. Aside from those uses, IQ tests figure most prominently in the diagnosis of learning disabilities. The problem with that, says Dr. Jack Naglieri, is that IQ scores don't tell us much about which intervention strategies are likely to be effective with a given child (Benson, 2003). To remedy this, Naglieri and others are developing tests that place less emphasis on a single number, such as IQ, and more on classifying people in ways that suggest helping strategies, such as identifying reading problems, perceptual problems, or attention disorders.

Psychology Matters

What Can You Do for an Exceptional Child?

As we have noted, intellectual disability and giftedness lie at opposite ends of the intelligence spectrum. As traditionally conceived, **intellectual disability** occupies the IQ range below 70—taking in scores achieved by approximately 2% of the population. Arbitrarily, **giftedness** begins 30 points above average, at 130 points, comprising another 2% of the population. Bearing in mind all we have learned about limitations of IQ tests, let's take a brief look at these two categories.

Intellectual Disability

The most current view of intellectual disability deemphasizes IQ scores by focusing on practical abilities to get along

in the world (Robinson and others, 2000). The American Association on Intellectual and Developmental Disabilities defines intellectual disability as involving significant limitations in both intellectual functioning and adaptive behaviors that become apparent before age 18. Limitations in intellectual functioning can be measured by an IQ score of 70–75, while adaptive behaviors include social skills, practical skills such as transportation, self care, and occupational skills, and conceptual skills such as understanding money, language, and time.

Causes of Intellectual Disability

Intellectual disability has many causes (Daily and others, 2000; Scott & Carran, 1987). Some, such as Down syndrome, are known to be genetic because we can point to a specific genetically controlled defect. Some causes are purely environmental, as in *fetal alcohol syndrome,* which involves brain damage incurred before birth, resulting from maternal abuse of alcohol during pregnancy. Other environmental causes include postnatal accidents that damage the cognitive regions of the brain, or conditions of deprivation or neglect that fail to give the developing child experiences needed for intellectual growth. Some cases have no known cause.

Dealing With Intellectual Disability

We have no cures, although research has found preventive measures for certain types of intellectual disability. For example, a simple test performed routinely on newborn babies can identify a hidden genetic disorder known as PKU. If detected early, disability usually associated with PKU can be prevented by a special diet. More generally, genetic counseling, pregnancy care services, and education of new parents are other preventive strategies (Scott & Carran, 1987).

Aside from prevention, special education programs help those with intellectual disability learn vocational and independent living skills. Meanwhile, biological scientists hope one day to treat genetically based forms of intellectual disability with therapies just now being conceived. For example, genetic treatment may involve splicing a healthy gene into a benign virus to "infect" all the cells of a person with certain types of intellectual disability and replace a defective gene. At present, genetic treatments for intellectual disability are at least a few years away.

For now, what can you do if you have a child with an intellectual disability? Because the nervous system is so immature at birth and so much physical and mental development occurs during the first years of life, early interventions will likely have the greatest payoffs. Psychological approaches involving sensory stimulation and social interaction can be enormously important. With the benefit of an optimal educational program, gains of up to 15 IQ points are possible (Robinson and others, 2000).

In fact, an enriched environment may be just as helpful to a child with intellectual disability as it is to a gifted child. Teams of special education teachers, speech therapists, educational psychologists, physicians, and other specialists can devise programs to teach students to capitalize on the abilities they have, rather than being held prisoner by their disabilities (Schroeder and others, 1987). Behavior modification programs have been especially successful. As a result, many citizens with intellectual disabilities have learned to care for themselves and acquired vocational skills enabling them to live independently (Landesman & Butterfield, 1987).

The Special Olympics offers children with intellectual disabilities (and others with disabilities) an opportunity to capitalize on their abilities and to build self-esteem.

Giftedness

At the other end of the intelligence spectrum are the "gifted," with especially high IQs, typically defined as being in the top 1% or 2% of the population (Robinson and others, 2000). But does a high IQ give its owner an advantage in life? A long look at gifted individuals suggests that it does.

Terman's Studies of Giftedness

The most extensive study of gifted individuals began in 1921 under the direction of Lewis Terman, the same person who brought Binet and Simon's IQ test to the United States (Leslie, 2000). From a large pool of children tested in California schools, Terman selected 1,528 children who scored near the top of the IQ range. His longitudinal research program followed these children as they went through school and into adulthood. Periodically through their lives, Terman retested them and gathered information on their achievements and adjustment patterns. The resulting decades of data revealed much about the nature of giftedness. Almost uniformly, Terman's gifted children excelled in school—as one might expect from the strong correlation between IQ and academic achievement. Terman also remarked on the good health and happiness of children in his sample, although newer evidence suggests that highly gifted children are susceptible to certain physical and psychological disorders (Winner, 2000).

As they moved into adulthood, the gifted group continued on the path of success. An unusually high number of scientists, writers, and professionals emerged from its ranks. Together

they published more than 2,000 scientific articles, patented 235 inventions, and wrote 92 books. By middle age, more than 86% of the men in Terman's sample had entered high-status professions (Terman & Oden, 1959).

Yet, for all their achievements, no one in this high-IQ sample achieved the level of an Albert Einstein, a Marie Curie, a Leonardo da Vinci, or legendary British Prime Minister Margaret Thatcher (whose IQ score was 180). Nor did a high IQ guarantee wealth or stature. In fact, many from Terman's sample led ordinary, undistinguished lives. The most visibly successful seemed to have, in addition to their high IQs, extraordinary motivation and someone at home or at school who was especially encouraging to them (Goleman, 1980; Oden, 1968)—some of the same characteristics found to be markers of "genius."

Dealing with Giftedness

Imagine you are the parent of a child with a very high IQ score, say 145. Which of the following would be the best course of action?

- Enroll your child in special after-school classes.
- Hire a tutor to help the child with his or her homework.
- Send the child to a private school.
- Do nothing special.

What do experts say? Don't rush out to enroll your child in special classes or provide other "help" because of his or her IQ score (Csikszentmihalyi and others, 1993; Wong & Csikszentmihalyi, 1991). Parents can destroy the spark of curiosity by pushing a child toward goals that do not hold the child's interest. Chances are you have already provided an environment in which your child's native ability could thrive. So do not make any rash and radical changes.

Above all, avoid making the child feel different because of his or her unusual abilities and high IQ score. In part because of the personality traits common in gifted children—especially a tendency to spend time alone, working on their interests—they are already more likely than other children to suffer social and emotional disorders (Winner, 2000). Nor should you feel smug about your genetic contribution to your child's intellect.

Remember that intelligence involves a nature–nurture interaction—and, besides, IQ tests sample only a small fraction of human abilities. Other people's kids may have equally amazing abilities in untested regions of their intellects. In fact, many gifted individuals go unrecognized by schools because their outstanding talent shows up primarily in art or music—domains in which formal abilities testing is rarely done.

Remember, also, that a high IQ is no guarantee of high motivation, high creativity, or success in life. All it guarantees is an intellectual opportunity.

So, what should you do with a bright child? Nothing special that you would not have done before you knew his or her IQ score.

Key Question: Is Intelligence One or Many Abilities?

Core Concept 6.4

Some psychologists believe that intelligence comprises one general factor, *g*, while others believe that intelligence is a collection of distinct abilities.

People who show aptitude in one area—language, for example—often score high on tests of other domains as well, such as mathematics or spatial relationships. This fact argues for the idea of a single, general intellectual ability. But there are some glaring exceptions, such as persons with **savant syndrome**. These rare individuals have a remarkable, but limited, talent, such as the ability to multiply numbers quickly in their heads or determine the day of the week for any given date, even though they are mentally slow in other ways (Treffert & Wallace, 2002). Typically, they also show symptoms of an autism spectrum disorder (Winner, 2000)—you may have seen in Dustin Hoffman's classic portrayal of one such person in the film *Rain Man*. Such cases raise a serious question about the whole concept of a single, general intelligence factor. Obviously, there is no simple solution to the question of one or many intelligences. However, different psychologists have dealt with this issue in different ways as core concept suggests:

Some psychologists believe that intelligence comprises one general factor, g, while others believe that intelligence is a collection of distinct abilities.

We will first examine this issue from the viewpoint of psychologists in the *psychometric tradition:* those who have been interested in developing tests to measure mental abilities. Following that, we will look at intelligence from the standpoint of cognitive psychologists, who bring a fresh perspective to the problem.

By the end of this section, you will be able to:

6.10 **Explain the psychometric theories of intelligence**

6.11 **Describe the cognitive viewpoint of intelligence**

6.12 **Recall the way different cultures attempt to understand intelligence**

6.13 **Report some of the studies that indicate animals are capable of intelligent behavior and cognition**

6.10: Psychometric Theories of Intelligence

Objective: Explain the psychometric theories of intelligence

Psychometrics is the field of "mental measurements." It is the psychological specialty that has given us most of our IQ tests, achievement tests, personality tests, the SAT, and a variety of other assessment instruments. Many pioneers in psychology, including Alfred Binet and Lewis Terman, carved their professional niches with contributions to psychometrics. Yet another famous figure in this field was Charles Spearman, a psychologist best known for his work suggesting that intelligence is a single factor.

6.10.1: Spearman's *g* Factor

By the 1920s, there were many tests of intelligence available, and British psychologist Charles Spearman (1927) found that individuals' scores on different tests tend to be highly correlated; in other words, those who score high on one test also generally score high on others. These correlations, he said, point to a single, common factor of general intelligence underlying performance across all intellectual domains. Spearman did not deny that some people have outstanding talents or deficits in certain areas. But, he said, these individual differences should not blind us to a single general intelligence factor at work behind all our mental activity. Spearman called this general intellectual ability the **g factor**. He assumed this general factor is innate, and most psychologists at the time agreed with him (Tyler, 1988). More current studies also find strong support for a *g* factor (Johnson and others, 2008), as well as evidence of a significant innate component (Haworth and others, 2010).

Neuroscientists find some support for Spearman's theory, too. Various tests of *g* all point to certain regions of the brain, especially in the frontal lobes (Duncan and others, 2000; Haier and others, 2004). Could these be the loci of *g*? Although some neuroscientists think so, others believe this explanation oversimplifies both the nature of intelligence and of the brain (McArdle and others, 2002; Sternberg, 1999, 2000). In general, psychologists accept the existence of a *g* factor but debate the parameters and meaning of what it actually measures.

6.10.2: Cattell's Fluid and Crystallized Intelligence

Using sophisticated mathematical techniques, Raymond Cattell (1963) determined that general intelligence can be broken down into two relatively independent components he called **crystallized intelligence** and **fluid intelligence**.

- Crystallized intelligence, said Cattell, consists of the knowledge a person has acquired, plus the ability to access that knowledge. Thus, crystallized intelligence relates to the person's ability to store and retrieve information from **semantic memory**. It is measured by tests of vocabulary, arithmetic, and general information.

- In contrast, Cattell proposed fluid intelligence as the ability to see complex relationships and solve problems—abilities that involve **algorithms** and **heuristics** and general thinking skills. Fluid intelligence is often measured by tests of block design and spatial visualization, tests that do not rely on the individual possessing certain "crystallized" background information to solve a problem.

For Cattell, both types of intelligence were essential to adaptive living.

6.11: Cognitive Theories of Intelligence

Objective: Describe the cognitive viewpoint of intelligence

Late in the 20th century, when the cognitive perspective emerged as a major force in psychology, it produced some radical new ideas about intelligence. In brief, the cognitive view of intelligence went well beyond the emphasis on vocabulary, logic, problem solving, and other skills previously measured to predict school success (see Table 6.1).

Table 6.1 Theories of Intelligence Compared

Spearman	Cattell	Sternberg	Gardner
g factor	Crystallized intelligence		
	Fluid intelligence	Analytical intelligence	Naturalistic intelligence
			Logical–mathematical intelligence
		Creative intelligence	Linguistic intelligence
			Spatial intelligence
			Musical intelligence
			Bodily–kinesthetic intelligence
		Practical intelligence	Interpersonal intelligence
			Intrapersonal intelligence

NOTE: Different theorists see intelligence as having different components, as shown in the columns of this table. The rows show roughly comparable components of intelligence described by various theories (although the reader should be aware that the correspondences are not exact). For example, Sternberg's practical intelligence is similar to Gardner's two components, called interpersonal intelligence and intrapersonal intelligence, while Spearman's *g* ignores these abilities.

Intelligence, said cognitive psychologists, includes cognitive processes underlying success in many areas of life—not just school (Sternberg, 2000)—and thus is much broader than the psychometric notion of intelligence. Instead of asking, "How smart *are* you?" cognitive theories ask, "*How* are you smart?" We will focus on the two most prominent of these cognitive theories.

6.11.1: Sternberg's Triarchic Theory

1. You may know someone who seems to have plenty of "book smarts" but is not very successful in life, perhaps because they don't get along well with others or deal effectively with unexpected events. Psychologist Robert Sternberg says they lack **practical intelligence**. Practical intelligence is sometimes called "street smarts," although it applies just as well at home, on the job, or at school as it does on the street. At its core is the ability to adapt to your environment, to shape an environment to suit your needs, or to find an environment in which you can thrive. Self-awareness, or knowledge of your strengths and limitations, is an important component of practical intelligence.

2. In contrast with practical intelligence, Sternberg calls the abilities measured by most IQ tests **analytical intelligence**, relying on problem solving, rational judgment, and the ability to compare and contrast ideas. Your grades in college are likely to be closely related to this logical reasoning ability.

3. **Creative intelligence**, Sternberg's third type of intelligence, helps people develop new ideas and see new relationships among concepts. Creative intelligence is what Picasso used to develop the form of painting called *Cubism* and what Einstein used to formulate his theory of relativity. It is also the form of intelligence Sternberg used to develop his new theory of intelligence.

Sternberg's three-part formulation is often called the **triarchic theory** of intelligence, because it combines three (*tri* = three) different kinds of intelligence. For Sternberg, each of these abilities—practical intelligence, analytical intelligence, and creative intelligence—is relatively independent of the others. In other words, a person's ability in one of the three areas doesn't necessarily predict his or her intelligence in the other two. Each represents a different dimension for describing and evaluating human performance. This theory suggests it is inaccurate to think of a single IQ score as summarizing all that is important or valuable about people's mental

Figure 6.10 Examples of Sternberg's Intelligences

Here you can see a few examples of the types of abilities involved in each of Sternberg's three components of intelligence.

SOURCE: http://thesecondprinciple.com/wp-content/uploads/2014/03/sternberg-chart.jpg

Analytical	Creative	Practical
Analyze	Create	Apply
Critique	Invent	Use
Judge	Discover	Put into practice
Compare/contrast	Imagine if . . .	Implement
Evaluate	Suppose that . . .	Employ
Assess	Predict	Render practical

abilities (Sternberg, 1999; Sternberg and others, 1995). Take a look at Figure 6.10 for some examples of Sternberg's intelligences.

More recently, Sternberg (2003) put forth an additional element of intelligence—namely, wisdom. For Sternberg, **wisdom** involves using one's intelligence, whether it be analytical, practical, or creative, toward a common good rather than a selfish pursuit. For example, a car salesman who convinces a buyer to purchase a defective car may demonstrate practical intelligence, but not wisdom. Only by promoting wisdom can we achieve the societal goals that most people desire, says Sternberg. And research indicates he may be right, in at least one respect: Studies show that wisdom is one predictor of well-being in later life (Bianchi, 1994; Hartman, 2000).

6.11.2: Gardner's Multiple Intelligences

Like Sternberg, Harvard psychologist Howard Gardner views traditional IQ tests as limited measures of human mental abilities. But Gardner argues we have at least eight separate mental abilities, which he calls **multiple intelligences** (Ellison, 1984; Gardner, 1983, 1999a, 1999b). Figure 6.11 describes each of Gardner's proposed intelligences; take a few minutes now to consider it.

Each of these intelligences arises from a separate module in the brain, Gardner claims. The latter two, interpersonal and intrapersonal intelligence, are similar to a capacity some psychologists call **emotional intelligence** (sometimes referred to as "EQ"). People who are high in emotional intelligence are good at "reading" other people's emotional states, as well as being especially aware of their own emotional responses.

Figure 6.11 Gardner's Multiple Intelligences

Linguistic and Logical-Mathematical Intelligence

1. **Linguistic intelligence:** Often measured on traditional IQ tests by vocabulary tests and tests of reading comprehension
2. **Logical-mathematical intelligence:** Also measured on most IQ tests with analogies, math problems, and logic problems

Spatial and Musical Intelligence

3. **Spatial intelligence:** The ability to form and manipulate mental images of objects and to think about their relationships in space
4. **Musical intelligence:** The ability to perform, compose, and appreciate musical patterns, including patterns of rhythms and pitches

Bodily Kinesthetic and Naturalistic Intelligence

5. **Bodily kinesthetic intelligence:** The ability for controlled movement and coordination, such as that needed by an athlete or a surgeon
6. **Naturalistic intelligence:** The ability to classify living things as members of diverse groups (e.g., dogs, petunias, bacteria) and recognize subtle changes in one's environment

Interpersonal and Intrapersonal Intelligence

7. **Interpersonal intelligence:** The ability to understand other people's intentions, emotions, motives, and actions, as well as to work effectively with others
8. **Intrapersonal intelligence:** The ability to know oneself, to develop a satisfactory sense of identity, and to regulate one's life

6.11.3: Assessing Cognitive Theories of Intelligence

Perhaps the major contribution of the cognitive theories to our study of intelligence is their culturally inclusive value system: For cognitive theorists, there are many ways to excel, and one way is not necessarily superior to others. This notion has broad appeal. The challenge for these theories, though, lies in assessment: How can we reliably measure creative, practical, or interpersonal intelligence? And what do they predict?

In an impressive project that was itself both creative and practical, Sternberg and his associates developed supplemental questions for SAT tests designed to measure creative and practical intelligences (Sternberg, 2007). Students wrote, for example, a story to go with the title *The Octopus's Sneakers,* or created a caption for an untitled comic strip, to measure creative intelligence.

A variety of verbal and nonverbal problems—such as how to respond if you ask a professor for a letter of recommendation but the professor appears not to recognize you—aimed to assess practical intelligence. Figure 6.12 lists several examples of the new questions. Sternberg's team scored the questions using originality, appropriateness to the context, and engagement to assess creative intelligence, with feasibility and suitability to the context as evaluators of practical intelligence. The results? Not only did the new tests prove to be valid measures of creativity and practical intelligence, they greatly increased colleges' ability to predict freshman success. They also reduced ethnic group differences in college admissions, as the diversity of test questions was better able to identify cultural variations in demonstration of intelligence (Sternberg and others, 2006)—which is precisely the angle on intelligence we will examine next.

Figure 6.12 Testing for Creative and Practical Intelligence

SOURCE: http://rethinkingadmissions.wfu.edu/docs/presenters/sternberg.pdf

Imagine that you have just eaten lunch in a restaurant, and when you got the check for it you realize that you don't have enough money to cover it all.
Sample Question of Practical Intelligence
How would you handle this situation?

Imagine that you are just seeing your significant other for the first time after a long time apart. At the same time, a close friend is asking for your immediate help with a personal matter.
Sample Question of Practical Intelligence
How would you handle this situation?

6.12: Cultural Definitions of Intelligence

Objective: Recall the way different cultures attempt to understand intelligence

Both Sternberg and Gardner see all components of intelligence as equally important. Yet the value of each is also culturally determined, according to what is needed by, useful to, and prized by a given society. In China, intelligence involves, among other things, extensive knowledge, determination, social responsibility, and ability for imitation. Alternatively, if you lived in a Pacific island culture, which would matter more: your SAT scores or your ability to navigate a boat on the open ocean? With such examples, cross-cultural psychologists have called our attention to the notion that "intelligence" can have quite different meanings in different cultures (Sternberg, 2000, 2004). In fact, many languages have no word at all for intelligence as we conceive of it: the mental processes associated with logic, vocabulary, mathematical ability, abstract thought, and academic success (Matsumoto, 1996).

6.12.1: African Concepts of Intelligence

In rural Kenya, Sternberg found that children with the greatest practical intelligence skills actually scored lower on traditional IQ tests that measure academic success. "In Kenya," says Sternberg, "good grades don't get you anywhere. You're better off getting an apprenticeship or learning to mine or fish—those will allow you to support a family" (Winerman, 2005b). Consequently, the kids with the best minds don't learn academic skills but concentrate instead on practical skills that will get them ahead in life.

The Western assumption that intelligence is associated with school success and quick solutions to problems is not universal. The Buganda people in Uganda, for example, associate intelligence with slow and thoughtful responses. Yet another view is found among the Djerma-Sonhai in Niger (West Africa), who see intelligence as a combination of social skills and good memory.

6.12.2: A Native American Concept of Intelligence

John Berry (1992) extensively studied mental abilities considered valuable among Native Americans. He began by asking adult volunteers among the Cree in northern Ontario to provide him with Cree words that describe aspects of thinking, starting with examples like "smart" or

Intelligence means different things in different cultures.

"intelligent." The most frequent responses translate roughly to "wise, thinks hard, and thinks carefully."

Although Cree children attend schools introduced by the dominant Anglo (English-European) culture, the Cree themselves make a distinction between "school" intelligence and the "good thinking" valued in the Cree culture that seems to center on being respectful. As one respondent explained, intelligence "is being respectful in the Indian sense. You need to really know the other person and respect them for what they are" (Berry, 1992, p. 79). This attitude of respect for others is widespread in Native American cultures.

One term Berry's respondents offered as an example of the opposite of intelligence translates as "lives like a White." This refers disparagingly to behaviors the Cree have observed among some Anglo people. The Cree define "lives like a White" as a combination of being "stupid" and having "backwards knowledge." A "stupid" person does not know the necessary skills for survival and does not learn by respecting and listening to elders. One who has "backwards knowledge" disrupts relationships, creating disharmony, instead of encouraging smooth interactions with others. Such disruption is not necessarily intentional or malicious. For example, an English teacher may ask Cree students to write an essay to persuade others to change certain behaviors. However, in Cree culture, the concept of "persuading" interferes with the traditional Cree value of "accepting others as they are." By encouraging such questioning of elders and traditions—a common practice in Anglo education—the teacher promotes disruption, which may be a path to "wisdom" in Anglo culture but is "backward" in Cree views of intelligence.

As you can see from these examples, different cultures have different notions of intelligence. To understand and cooperate with people of diverse heritages, perhaps the most "intelligent" behavior is to resist the impulse to impose our own definition of "intelligence" on others.

6.13: The Question of Animal Intelligence

Objective: Report some of the studies that indicate animals are capable of intelligent behavior and cognition

Animals can be taught to perform amazing tricks, as anyone who has ever been to the circus can attest. In the wild, packs of wolves, prides of lions, and pods of killer whales commonly cooperate in making a kill and in raising their young. Even your cat may act with skill and cunning as she herds you toward the kitchen in apparent hope of being fed. But do these feats demonstrate true thinking and intelligence, or merely **operant conditioning**—the ability to learn from previous consequences

Historically, scientists dismissed the idea of animal cognition as simple trained-animal tricks in disguise—until startling new reports began trickling in from scientists like Jane Goodall. Risking her career—and her life—in the jungles of Tanzania, Goodall spent 30 years watching and recording the behavior of wild chimpanzees (Goodall, 1986). And her gamble paid off handsomely. To give just one example from her long list of discoveries, Goodall reported that chimps strip leaves from twigs and use them to extract tasty morsels from a termite nest. Why was that amazing? She had discovered chimpanzees could make and use tools—an ability requiring forethought and planning, previously believed to set humans apart from the rest of the animal kingdom. Goodall's work, then, raised the provocative question of human uniqueness.

6.13.1: What Abilities Make Humans Unique?

If not tool making, what distinctive cognitive abilities might we humans possess? One possibility is a **theory of mind**. For example, a poker player uses a theory of mind when bluffing. So does a child who lies about raiding the cookie jar. But recent animal research shows the lowly Western scrub jay (a relative of the crow) may also have a theory of mind: When a scrub jay sees another bird watching while it is hiding a grub for a later meal, the jay will return later and re-hide the grub in another location (Dally and others, 2005). Theory of mind has also been demonstrated in chimpanzees, dolphins, and crows. So much for human-only theory of mind conjecture!

Perhaps, then, it is *language* that distinguishes humans from animals. But alas for human pride! Animal behaviorist Karl Von Fritsch (1974) showed that a honeybee discovering a new source of nectar uses a language consisting of a "waggle dance," performed along a wall

inside the hive, that conveys the direction and distance of the food. Other scientists point out that many animals use distinctive sounds to communicate different "ideas," such as the approach of a predator. But such animal communications have a limited repertoire: Do they qualify as true language?

6.13.2: Language of the Apes

One step toward the answer to that question came from researchers Allen and Beatrix Gardner (1969), who taught a chimpanzee named Washoe language skills previously thought to be impossible in nonhuman animals. By "adopting" Washoe when she was just 10 months old and raising her in an environment similar to that of a human child, the Gardners taught Washoe to communicate using American Sign Language (Dewsbury, 1996). By age 5, Washoe could sign some 160 words, and what's more, put them together in "sentences," as when she would declare, "Me Washoe" or request, "Please tickle more." She could even create novel signs in unfamiliar situations, as when she first saw a swan and signed "water bird." And, quite remarkably, she demonstrated emotional intelligence as well: When one of her caretakers, who had missed work for a time following a miscarriage, explained her absence to Washoe by signing, "My baby died," Washoe reportedly looked deep into the caretaker's eyes, then slowly and carefully signed "Cry," touching her cheek. Later that day, when it was time for the caretaker to leave, Washoe resisted, signing "Please person hug" (Fouts, 1997).

A parade of other primates followed in Washoe's footsteps by communicating with sign language, with plastic tokens of various shapes, and even with computers. Some outstripped Washoe by achieving vocabularies of up to 500 words (Savage-Rumbaugh, 1990) and responding to human vocal language in addition to sign language (Rumbaugh & Savage-Rumbaugh, 1994). A bonobo named Kanzi has an impressive language repertoire that includes concept words like *tomorrow* and *from*, as well as some elements of grammar, such as appropriate use of *–ing* and *–ed* to signal tense. When asked "Are you ready to play?" after a visitor who had promised to play with Kanzi finally showed up, Kanzi responded, "Past ready" (Kluger, 2010)—perhaps demonstrating a sense of wry humor in addition to language prowess. And a gorilla named Koko has been caught signing lies—which, incidentally, also demonstrates theory of mind (Patterson & Linden, 1981)—and even "swearing" at her handler in ASL, making the signs for "dirty toilet." At this point, then, most psychologists are convinced that primates can learn at least the rudiments of human language, perhaps at the level of a 21/2-year-old human.

Channels of communication have also opened to a variety of other species. Dolphins have been taught to

interpret and respond to complex strings of gestures and sounds. An African gray parrot, who answered to the name of Alex, could not only speak but count up to six objects and understand concepts such as size, giving the correct answers to questions such as "Which one is bigger?" And, not to be outdone, a Border collie named Chaser knows the names of more than 1,000 toys and can also classify them by function and shape (Viegas, 2011).

6.13.3: What Are the Lessons of Research on Animal Language and Intelligence?

Without doubt, animals are capable of intelligent behavior, and all but the strictest of behaviorists would acknowledge that many animals are capable of cognition. And these abilities serve them well: Most animals are exquisitely adapted to a particular biological niche, which makes them intelligent in ways that aid their survival. When language is viewed as an adaptive function of a species, animals excel at it—in a manner that suits their species, not ours. Prairie dogs and meerkats signal each other differently in response to different predators; dolphins and whales use sounds and body language to effectively communicate desires to play, hunt, and mate; and even the lowly squid send messages to each other via changes in color and shape. In all these ways, animals communicate effectively, demonstrating species-specific intelligence.

The study of language and problem solving in nonhuman animals has pulled us down from our self-constructed pedestal by demonstrating that other creatures are capable of using what humans define as language at a surprising level of sophistication. Those who worry about maintaining feelings of species superiority, however, can take comfort in the knowledge that human language displays far more grammatical structure and productivity than do languages of other animals—but, to some extent, even that finding may reflect our limited ability to accurately measure animal language. As our research methods evolve, so does our understanding: One species of monkeys in the wild has recently been found to use syntax, a higher-order marker of language defined as the ability to combine units of language (such as sounds or words) in different ways to signal different meanings—much like humans distinguish between "Jesse groomed the dog," and "The dog groomed Jesse" (Ouattara and others, 2009). And Chaser the Border collie reportedly understands the distinction between nouns and verbs. Although human language abilities have certainly allowed us to grapple with abstract problems far greater than those in the animal world, we must acknowledge the human-centric nature of our perspective and be mindful of the limitations of both our perspective and our methods.

Psychology Matters

Test Scores and the Self-Fulfilling Prophecy

If you have ever been called "slow," "shy," "plain," "bossy," or "uncoordinated," you know, firsthand, the powerful effect labels and expectations can have. Such labels can influence not only people's beliefs but also their outcomes. Research in psychology sheds light on this fascinating process.

Expectations Influence Student Performance

You may recall the research in which students who were told that they had "smart" rats treated their rats with more enthusiasm and encouragement than did the students who were told their rats were "slow learners," and the differences actually influenced rats' performance on tasks such as maze running. Robert Rosenthal and Lenore Jacobson, the researchers who led that study, also wondered if teachers' expectations could similarly affect students' performance.

To find out, they gave grade school teachers erroneous information about the academic potential of about 20% of their students (approximately five in each classroom). Specifically, teachers were told some students had been identified by a standardized test as "bloomers" who would blossom academically during the coming year. In fact, testing had revealed no such thing; the "bloomers" had been randomly selected by the experimenters.

Knowing what happened with the rats, you might guess what happened in the classroom. Children whom teachers expected to blossom did exactly that. Further research identified four factors that made the difference (Harris & Rosenthal, 1986): Teachers unknowingly created a more encouraging climate for the students they expected to "bloom," gave them more differentiated feedback and more opportunities to demonstrate their knowledge, and also challenged them with more difficult work. Teachers rated these children as more curious and having more potential for success in life than other children. They also saw them as happier, more interesting, better adjusted, more affectionate, and needing less social approval. Significantly, at the end of the year, the "bloomers" (who were really just randomly chosen children) made greater gains in IQ points than did students who did not get special treatment. The gains were especially pronounced among first and second graders. Rosenthal and Jacobson call this effect a **self-fulfilling prophecy**. You can see it operating anywhere that people live up to the expectations of others—or of themselves.

What happened to the other children in these same classrooms—did any of them gain IQ points as well? What do you think?

Tests showed they did, although not as many as "bloomers." But an unexpected, and disturbing, negative correlation surfaced: The more IQ points gained by the students *not* expected

to bloom, the less interesting and well-adjusted they were rated by their teachers. Based on that, Rosenthal (2002) cautions that unexpected intellectual growth may create negative responses from others in the environment—a possibility he suggests is worthy of further exploration.

The Self-Fulfilling Prophecy: Beyond the Classroom

Extending the pioneering work of Robert Rosenthal, social psychologists have carried their investigations out of the classroom to find self-fulfilling prophecies in other environments. In the workplace, positive expectations of employees have been found to raise productivity significantly; in the military, positive expectations raise performance to even greater levels than those observed in the private sector (Kierein & Gold, 2000). In jury trials, judges may deliver instructions to the jury differently when the judge thinks the suspect is guilty than when the judge perceives innocence—a difference that increases the likelihood of the defendant being found guilty by more than 30% (Rosenthal, 2002). And one randomized, double-blind study in a nursing home found that when caregivers had higher expectations, depression rates among patients decreased (Learman and others, 1990). Clearly, expectations from others can exert a powerful psychological influence on our own beliefs and even our outcomes.

Key Question: How Do Psychologists Explain IQ Differences Among Groups?

Core Concept 6.5

While most psychologists agree that both heredity and environment affect intelligence, they disagree on the source of IQ differences among racial and social groups.

While we find the full range of IQ scores in every ethnic group, we also find IQ differences among groups (Rushton & Jensen, 2005). In the United States, Americans of Asian extraction score higher, on average, than do Euro-Americans. Hispanics, African Americans, and Native Americans—again, on average—score lower. And we find group differences based on social class as well: Children from middle-income homes score higher on IQ tests than those from low-income homes (Jensen & Figueroa, 1975; Oakland & Glutting, 1990). Nobody denies that these differences exist. What experts disagree about are the causes of these IQ discrepancies. As we will see, that disagreement is another example of the nature–nurture controversy. Consider the issue as described by the core concept:

> While most psychologists agree that both heredity and environment affect intelligence, they disagree on the source of IQ differences among racial and social groups.

The controversy over the source of intelligence is potentially of great importance for people's lives—and a politically hot issue. And when race becomes involved, such issues become even hotter. Never mind that the concept of distinct human "races" has no precise biological meaning, but rather a social one (Cooper, 2005; Sternberg and others, 2005).

If we assume intelligence is primarily the result of innate (hereditary) factors, we will likely conclude it is fixed and unchangeable. For some, this easily leads to the conclusion that a group (usually a racial group) with lower IQ scores must be innately inferior and, perhaps, should be treated as second-class citizens. On the other hand, if we conclude that intelligence is shaped largely by experience (environment), we are more likely to make a range of educational opportunities available for everyone and to view people of all ethnic, cultural, and economic groups as equals. Either way, our conclusion may become a **self-fulfilling prophecy**.

In the early 1900s, Henry Goddard, an influential psychologist who believed that intelligence is a hereditary trait, proposed all immigrants undergo tests in order to exclude those found to be "mentally defective" (Strickland, 2000). In 1924, Congress passed legislation to limit immigration of groups and nationalities "proven" to be of inferior intellect—based largely on Goddard's data. Among the groups restricted were Jews, Italians, and Russians. What Goddard and the U.S. Congress ignored was that the tests were given in English—often to people with little familiarity with the English language and the culture in which the tests were conceived. No wonder many of these immigrants received low scores!

Today we are more aware of the shortcomings of intelligence tests. We also know that, while heredity has an effect on an individual's intelligence, experience does, too. And we know that Goddard used faulty reasoning when he concluded that heredity accounts for group differences in intelligence.

In actuality, neither the hereditarian nor the environmentalist view is completely right. Repeatedly in this text, we have seen that psychologists now recognize the roles of both heredity and environment in all our behavior and mental processes. But there is more to the issue of group differences than this. In this section, we will add an important complication to the heredity–environment interaction: While each *individual's* intelligence is determined, in part, by heredity, this fact does not mean that IQ differences *among groups* have some biological basis. On the contrary, many psychologists have argued that group differences are totally environmental—although this, too, is disputed, as our Core Concept suggests. Historically, the naturists' side

of the IQ question has received most attention—but what does research reveal? To understand how heredity could affect individual differences but not group differences, let us look first at evidence supporting the hereditarian and environmentalist arguments.

By the end of this section, you will be able to:

6.14 Explain the average degree of genetic contribution to intelligence

6.15 Examine the role of the environment in shaping intelligence

6.16 Describe research findings that suggest social and environmental contributions to intelligence

6.14: What Evidence Shows That Intelligence Is Influenced by Heredity?

Objective: Explain the average degree of genetic contribution to intelligence

Many lines of research indicate a hereditary influence on intelligence. Studies comparing IQ scores of identical twins with fraternal twins and other siblings show a strong genetic **correlation**. The gold standard for differentiating the effects of heredity and environment involves looking at children raised by adoptive parents and, in rare cases, twins separated at birth. Such studies reveal that IQs are more closely correlated between children and their biological parents than between children and adoptive parents (Plomin & DeFries, 1998). Work coming out of the Human Genome Project also supports the notion that intelligence has a genetic component, most likely involving the interaction of many genes (Chorney and others, 1998). The trend is clear: The closer the genetic relationship—from cousins to siblings to twins—the closer the relationship of IQ scores, as Table 6.2 shows.

In fact, studies of twins and adopted children reveal genetic influences on a whole range of attributes as diverse as heart functioning (Brown, 1990), personality traits (Tellegen and others, 1988), hypnotizability (Morgan and others, 1970), and intelligence (Sternberg and others, 2005).

While psychologists agree that heredity plays an important part in determining an individual's IQ scores, they also agree that it remains difficult to estimate the relative weights of heredity and environment (Sternberg and others, 2005). One reason for this is that children who live in the same family setting do not necessarily share precisely the same psychological environment. First-born children, for example, are treated differently from the youngest. (Can you think of several reasons for this?)

Table 6.2 Correlation of IQ Scores with Genetic Relationship

Here, you see **correlations** in IQs for pairs of individuals (the closer to 1.0, the stronger the association). IQ scores of identical twins reared together are more closely correlated (0.86) than IQs of mere siblings reared together (0.47), strongly suggesting a genetic component to intelligence.

Genetic Relationship	Correlation Between IQ Scores
Identical Twins	
reared together	0.86
reared apart	0.72
Fraternal Twins	
reared together	0.60
Siblings	
reared together	0.47
reared apart	0.24
Parent/Child	0.40
Foster Parent/Child	0.31
Cousins	0.15

SOURCE: Bouchard, T. J., & McGue, M. (2003). Familial studies of intelligence: A review. *Science, 212*, 1055–1059. Adapted with permission from AAAS.

6.15: What Evidence Shows That Intelligence Is Influenced by Environment?

Objective: Examine the role of the environment in shaping intelligence

The evidence for environmental influences on intellectual development is persuasive, too. For example, in a longitudinal study of 110 children from impoverished homes (Farah and others, 2008), researchers assessed children on both language ability and memory (two important aspects of intelligence). They also evaluated the children's home environments on two factors:

(a) How stimulating were they? (Judged by the child's access to such things as books and musical instruments)

(b) How nurturing were they? (Rated according to observations of positive emotional climate, along with attention and praise given by parents)

What the study revealed was a combination of the expected and the unexpected:

- A stimulating environment was strongly associated with language ability but not with memory.
- A nurturing environment was associated with memory but not with language ability.

How can we explain these results? The relationship between parental nurturing and memory mirrors results of

animal studies showing that nurturing reduces stress—and since production of stress hormones interferes with memory, it makes sense that nurturing might improve memory. The expected connection between environmental stimulation and language ability reinforced results from numerous other studies showing the positive impact of a rich environment on cognitive development.

Environmental effects surface even when we look for genetic effects: We find greater similarities of IQ among people who have been reared together than those reared apart. And, in laboratory animals, a stimulus-enriched habitat early in life results in a more complex, complete development of brain cells and cortical regions. The superior performance of these animals on a range of tasks persists through life. In other experiments, we find that young monkeys who are trained to solve problems and also offered companionship with other monkeys display more active curiosity and higher intelligence than those reared without this environmental stimulation.

Such findings hint that we might boost intellectual functioning of human infants by enriching their environments. Indeed, we will see that early intervention programs can raise children's IQ scores (Barlow, 2008). Moreover, the amount of schooling children receive correlates well with their IQ scores (Ceci & Williams, 1997). Even in adulthood, environmental factors, such as the cognitive complexity and intellectual demands of one's job, can influence mental abilities throughout life (Dixon and others, 1985).

Now, however, evidence is emerging to indicate that the IQ gap between Euro-Americans and African Americans is narrowing (Dickens and Flynn, 2006) —offering further support for the environment rather than heredity as the cause of the difference. Citing data from large groups on four different IQ tests over the past three decades, they find the gap has narrowed by up to 50%—which translates into nearly 8 IQ points (Krakovsky, 2007). There is more evidence for the environmental side of the nature–nurture debate about intelligence, but to understand it, we must pause to explore an important—and often misunderstood—concept: heritability.

6.16: *Heritability* (not *Heredity*) and Group Differences

Objective: Describe research findings that suggest social and environmental contributions to intelligence

We can all agree, then, that intelligence has a hereditary component (Dickens & Flynn, 2001; Neisser and others,

1996). But the influence of heredity on individual intelligence does not mean that heredity accounts for differences we observe *between* groups. To understand why this is so, we need to distinguish heredity from another important term: **heritability**. Specifically, heritability refers to the amount of trait variation *within a group* that can be attributed to genetic differences.

Figure 6.13 Examples of Variations in Heritability

Here, children are learning in a stimulating environment; thus, because their environment maximized the potential for all of them, we could attribute their individual differences in IQ to their heredity.

Here, for children in an impoverished Albanian orphanage, the lack of intellectual stimulation would result in lower IQs for all the children. Thus, since their genetic potential was limited by their impoverished environment, we would say their IQ had low heritability.

Because people are exposed to different cultural traditions and experience different levels of wealth or discrimination, we have no way to evaluate what proportion of differences *between* groups should be attributed to heredity or to environment. To reiterate: Heritability is a concept that refers to within-group differences, not between-group differences. Thus, it is important to realize that *we can speak of heritable differences only within a group of individuals who*

have shared essentially the same environment (Sternberg and others, 2005).

Another point is worth repeating, because it often gets mixed up with discussions of heritability: Biologists, including those working on the Human Genome Project, have determined that "race" is not a valid biological concept (Cooper, 2005; Sternberg and others, 2005). There are no biological boundaries defining different races. Even if we use a social definition, where people define their own racial group, differences between the gene pools of people who claim to be of different racial groups are very small compared to genetic differences among individual members of the same group (Bamshad & Olson, 2003). For all these reasons, then, evidence does not support the notion of genetic differences producing IQ discrepancies we observe among "racial" groups.

6.16.1: The Jensen Controversy

Despite the concerns we just cited, some psychologists remain unconvinced that environment can account for group differences in IQ (Nisbett, 2005; Rushton & Jensen, 2005). In the 1960s, for example, Harvard psychologist Arthur Jensen (1969) contended that racial differences in IQ have a substantial genetic basis. We can boost IQ scores to some extent, said Jensen, by helping the poor and disadvantaged, but there are limits imposed by heredity.

In support of his thesis, Jensen cited several studies showing a strong influence of heredity on IQ. He also presented a complex statistical argument showing only weak environmental effects on IQ and achievement. Then, turning his attention to government programs attempting to give extra help to disadvantaged Black children, Jensen claimed that, while most had shown some positive effects, none had erased the racial differences in performance. What remained must be a genetic difference in abilities, he maintained.

Over the next 5 years, more than 100 published articles responded to Jensen's challenge. In what became a heated debate, critics pointed out several factors Jensen minimized or ignored, including the effects of racism, lower teacher expectations for Black children, lack of opportunity, low self-esteem, and a White, middle-class bias built into IQ and achievement tests (Neisser, 1997; Neisser and others, 1996). While Jensen held steadfastly to original position until he died in 2012 (Jensen, 1998, 2000), many psychologists now agree that a combination of environmental factors can explain the differences on which Jensen built his case. Let us now look at some of the post-Jensen discoveries, beginning with a study of children whose environment had been altered by adoption.

6.16.2: The Scarr and Weinberg Adoption Study

A monumental study by Sandra Scarr and Richard Weinberg (1976, 1978) confronted the issue head-on by comparing 115 Black and White children who were adopted into similar home environments in Minnesota. Their research used educational records and IQ test scores from both the biological families and the adoptive families. For both groups of children, the biological parents had average IQ scores (near 100), while the adoptive parents' IQs were somewhat higher, averaging above 115.

What did Scarr and Weinberg find when they reexamined the IQ scores of these two groups of adoptees in late adolescence? There were no differences! Both the Black group and the White group of adoptees had scores that averaged about 110—significantly higher than their biological parents, though not quite as high as their adoptive parents. Such results testify to a powerful effect of the environment on IQ. The results also contradict Jensen's claim that group differences are genetic.

6.16.3: Social Class and IQ

Research on the relationship between social class and IQ shows similar environmental effects. Socioeconomic class (as reflected in an individual's financial status and lifestyle) clearly correlates with IQ: Affluence is associated with higher IQ scores, while groups with the lowest average IQ scores experience the greatest degree of poverty, illiteracy, and hopelessness. Supporters of the environmental position claim that racism and discrimination initially landed many minorities in impoverished neighborhoods, and these same factors continue to keep them there today.

How does social class affect IQ? The relationship is not a simple one: The negative effects of growing up in a disadvantaged home far outweigh the benefits of growing up in a wealthy family (Turkheimer and others, 2003). In fact, poverty creates circumstances that limit individual potential in many ways, particularly in terms of nutrition, health care, and education (Brown & Pollitt, 1996; Neisser and others, 1996). Poverty also means less-adequate health care, so it should not surprise you that researchers have linked poor health during pregnancy and low birth weight to low mental ability in children. Research also shows a significant proportion of children with low IQs adversely affected by "environmental insults," such as living in homes with lead-based paint chips peeling from walls, causing toxic lead exposure in children who ingest this material (Needleman and others, 1990). And poverty also means less of other factors known to promote intellectual

development, such as good nutrition and access to books and computers. Job schedules leaving parents little time to stimulate a child's intellect correlate with poverty as well, and can be detrimental to performance on tasks such as those demanded by IQ tests (for example, vocabulary or sentence comprehension). In fact, a new study in 2015, which did brain scans of more than 1,000 teens and young adults, found that those raised in poverty conditions had as much as 6% less brain mass than those raised in privileged conditions (Noble and others, 2015).

Poverty has other crippling effects, too. In most parts of the United States, public schools are funded by revenue from local property taxes. Thus, wealthy neighborhoods can provide bigger and better school facilities and amenities, while poorer districts may suffer from crowding, physically deteriorating structures, threats to personal safety, poorly prepared teachers, and lack of access to computers. In such environments, even children with the aptitude to learn may find it difficult to rise above their circumstances. Proponents of the view that environment has a strong influence on intelligence usually support equal-opportunity legislation, better schools, and intervention programs that help disadvantaged children build self-confidence and learn skills necessary to succeed in school (Tirozzi & Uro, 1997).

Turning our attention back to **heritability**, let's look at studies that focus on IQ differences among children in the *same family*, as compared with children in *different families*. Among families with poorly educated mothers, environmental factors, derived from a common environment shared within the family, accounted for more of the IQ variability than did the genetic differences between families. The opposite was true of children from families of well-educated mothers, where genetic effects were stronger. Again, the message is that genetic effects are stronger in enriched circumstances, while environmental effects show up more strongly in impoverished situations (Nisbett and others, 2012).

6.16.4: Head Start: A Successful Intervention Program

Originally implemented some 40 years ago to provide educational enrichment for disadvantaged children, Head Start grew from the assumption that many children from deprived families need an intellectual boost to prepare them for school. The program is intended to head off problems on several fronts by serving children's physical and mental needs with nutritional and medical support, plus a year or two of preschool education. Wisely, Head Start also involves parents in making policy, planning programs, working in classrooms, and learning about parenting and child development. Head Start centers around the

country currently serve about 900,000 children yearly (U.S. Department of Health and Human Services, 2011—estimated to be 40% of the number who need it (Ripple and others, 1999).

Does it work? Again, there is some controversy (Jensen, 1969; Kantrowitz, 1992), although a great deal of research suggests that Head Start does help disadvantaged children get ready for school (Garces and others, 2002; Ripple & Zigler, 2003). Children enrolled in the program score higher on IQ tests and have higher school achievement during early grades than a matched control group who received no such intervention (Zigler & Styfco, 1994). More important, their head start lasts. Although differences between Head Start children and control group kids diminish over time, the effects persist into adolescence. Among other things, Head Start children are less likely to be placed in special education classes, less likely to fail a grade, more likely to graduate from high school, and less likely to have trouble with the law.

Despite the positive effects of Head Start, newer research indicates programs such as this may not start early enough. Most children in Head Start are preschoolers, but educational intervention starting in the first months of life can raise infants' scores on intelligence tests by as much as 30% compared to control groups (Ramey & Ramey, 1998a, 1998b; Wickelgren, 1999). Although gains may diminish with time, especially if supportive programs are withdrawn, significant differences remain when intervention starts in infancy. Clearly, then, the earlier a child is immersed in an enriched environment, the stronger the effects.

6.16.5: Test Biases and Culture-Fair Tests

Still, other forces influence IQ scores and contribute to group differences, including problems with the IQ tests themselves. Many psychologists have argued that IQ test questions have built-in biases toward a middle- or upper-class background—biases that favor the White child (Helms, 1992). For an opposing view, however, that holds that test bias does *not* contribute to group differences in IQ scores, see Jensen (2000) and Reynolds (2000).

One source of possible bias stems from the fact that most IQ tests rely heavily on vocabulary level. This gives a big advantage to children who have been read to and who are encouraged to read. We can see a related bias in a well-known IQ test that asks for a definition of *opulent* (rich), a term one is far less likely to hear in a poor household. To their credit, however, test makers are working hard to rid their tests of items that discriminate against people of minority cultural backgrounds (Benson, 2003).

Noted psychologist Janet Helms (1992) points out another possible flaw in current IQ testing: It "assumes that White-American culture defines the most intellectually rich environment" (p. 1086). Seldom do we ask how well White children learn the norms of other cultures—which is a provocative and quite reasonable question. According to Helms, why should the Caucasian American norm be the standard by which everyone else is judged?

Psychologists realize that a culture-free test of ability or achievement is an impossibility. Nevertheless, most agree we should strive for *culture-fair* tests that minimize cultural biases as much as possible. So, for example, attempts are being made to develop nonverbal intelligence tests involving mazes and the manipulation of shapes as a means of overcoming test bias based on the test being constructed in a person's nonnative language.

Given the importance of reducing discrimination, what criticisms could possibly be leveled at the goal of culture-fair tests?

1. First, not all minority groups do poorly on traditional intelligence tests. For example, we have seen that Asian Americans often do better than Americans of European ancestry (Sue & Okazaki, 1990).

2. Second, culture-fair tests do a poorer job than traditional IQ tests of predicting academic success: Because they de-emphasize verbal skills, they fail to assess one of the more important components of school performance (Aiken, 1987; Humphreys, 1988).

6.16.6: *The Bell Curve:* Another Hereditarian Offensive

The dispute over causes of racial differences in IQ flared again in 1994. At issue was a book, *The Bell Curve: Intelligence and Class Structure in American Life*, by Richard Herrnstein and Charles Murray. The name echoes the bell-shaped "normal distribution" of IQ scores. Herrnstein and Murray argued that racial differences in IQ have a strong genetic basis. If these innate differences were accepted, the nation could move on to more enlightened and humane social policies, they said. Critics immediately identified a racist bias and also pointed to questionable science at the core of *The Bell Curve.*

How is *The Bell Curve*'s argument flawed? The answer will be familiar to you by now: While there is no doubt that heredity influences individual intelligence, Herrnstein and Murray, like hereditarians before them, offered no proof that differences *between groups* exposed to different environments have a hereditary basis (Coughlin, 1994; Fraser, 1995). Further, much of the "evidence" they offer is suspect (Kamin, 1994). One study cited by Herrnstein and Murray claimed to document the low IQs of Black Africans, but it relied on tests given in English—a language in which the Zulu subjects of the study were not fluent (Kamin, 1995). The test used in that study also assumed subjects were familiar with electrical appliances found in urban middle-class homes (rather than Zulu villages) and equipment, such as microscopes, not typically found in Zulu schools.

Compounding the problems in their analysis of the evidence, Herrnstein and Murray commit another critical thinking error that we have repeatedly emphasized in this text: They confuse correlation with causation. In fact, the Herrnstein and Murray argument is just as plausible when turned around: Poverty and all the social and economic disadvantages that go with it could just as well be important causes—rather than results—of low IQ scores.

Despite its flaws, *The Bell Curve* struck a chord with many Americans. It resonates with the preference for simple genetic "causes" for behavior rather than more complex explanations. But not every culture places such emphasis on genetic causes. We can see a different perspective in a study that asked Americans and Asians to account for a child's academic success: American respondents emphasized "innate ability," whereas Asian respondents emphasized the importance of "studying hard" (Stevenson and others, 1993). Thus, the idea that individual and group differences in performance have an innate basis is a widespread belief in American culture. Interestingly, however, Stanford professor Carol Dweck's (2007/2008) work shows that when parents and teachers adopt an approach similar to the Asian view, their children are more interested in school, learn more, and achieve higher grades.

6.16.7: Mindset and Stereotype Threat

Carol Dweck's interest in intelligence began in the sixth grade, when her teacher, Mrs. Wilson, assigned seats in her classroom according to students' IQ scores. Special privileges, such as carrying the flag, were also allowed for the high-IQ students, but not the low-scorers. Dweck remembers, "She let it be known that IQ for her was the ultimate measure of your intelligence and your character. So the students who had the best seats were always scared of taking another test and not being at the top anymore" (Trei, 2007).

Years later, professor Dweck realized that most people hold one of two views of intelligence—which she calls *mindsets*.

- One sees intelligence as fixed or relatively unchanging.
- The other mindset views intelligence as fluid or malleable, depending as much on motivation and experience as on innate ability.

Her research not only supports this dichotomy but shows that your IQ score depends on which "theory" you believe.

In one intervention study, her team coached a group of junior-high school students on study skills and taught them that, like a muscle, the brain could become stronger with use. She calls this idea the "growth mindset." A control group got the same study-skills training but were not pitched the idea that their mental abilities could be developed. If you guessed that the first group—the one with the growth mindset—markedly improved their grades, while the controls did not, you were right (Blackwell and others, 2007)! You can view Professor Dweck's TED Talk on the power of mindset by clicking on the link in the video resources box at the end of this chapter.

Unfortunately, many people believe their level of "smarts" is a given. And, as Dweck's work has shown, they usually live up (or down) to their expectations. This is, of course, the **expectancy bias** and the **self-fulfilling prophecy** at work. But there is a related sort of mindset that can be even more insidious because it can operate at the fringes of our awareness. Psychologist Claude Steele calls this **stereotype threat**.

Here's how stereotype threat works: When members of a group that has been widely characterized as less smart or less skilled are reminded of their group's stereotype, the results can be devastating, particularly in the classroom (Schwartz, 1997; Steele, 1997; Steele and others, 2002). One study found that merely being asked to identify their race resulted in lower scores for minority students on a test of academic abilities (Steele, 1997). In another study, a group of Black women taking an IQ test were told that White women usually do better on the test. As a result of this stereotype threat, these Black women received scores that averaged a full 10 points lower than a comparison group who were told that Black women usually receive high scores (Thomas, 1991).

Nor is stereotype threat just a racial or ethnic problem. We find it also in the domain of gender, where girls may learn to feel inferior in science and math, or boys may be taught they have lesser verbal skills. Stereotype threat can also intimidate older persons who worry about memory failure or that as "old dogs" they cannot learn "new tricks." Anyone who believes he or she is part of an inferior group is vulnerable to these feelings of anxiety, intimidation, and inferiority.

Is there a way to combat stereotype threat? Social psychologist Joshua Aronson and his colleagues (2001) found that grades improved for college students who were encouraged to think of intelligence as being influenced by experience and expectations rather than as a fixed trait.

The grades of African American students actually rose more than those of White students and those in a control group. Apparently, those who may have felt themselves targets of stereotype threat reaped the most benefits from this program. New research on stereotype threat also indicates that inferior performance by women and men in nontraditional fields, as well as by racial minorities in nontraditional fields, may be overcome when stereotypes are eliminated or countered.

Psychology Matters

Brain Training Programs: Do They Work?

Unless you have lived under a rock in the past few years, you have seen the ads: Neuroscientists have developed "brain training" programs that can improve your attention, sharpen your memory, make you a better problem-solver, and generally improve your cognitive abilities—for a price, of course. One, called Lumosity, claims that it has more than 70 million subscribers. Others include BrainHQ and Cogmed. But do they live up to the hype?

A perusal of their Web sites turns up pictures of young neuroscientists on the staff of each program, along with lists of research studies purporting to validate their approaches. A strong (but unstated) implication on those sites panders to the fears of older people, suggesting that brain training may prevent or treat mental decline and dementia (Koenig, 2014). Other studies seem to suggest that brain training is used extensively in the schools.

A closer look at the research, however, raises some important questions—questions so important, in fact, that a group of 69 leading neuroscientists and cognitive psychologists recently published a statement saying that there is no solid evidence to support the claims of brain training advocates (Max Planck Institute for Human Development and Stanford Center on Longevity, 2014). Echoing that report, the prestigious journal *Science* scoffed, "Aging baby boomers and seniors would be better off going for a hike than sitting down in front of one of the many video games designed to aid the brain" (Underwood, 2014).

In fact, the "research" touted by these companies typically does little more than show that people who play their computer games get better at playing those games. That is a long way from showing that such games produce general cognitive improvement or prevent dementia. To be sure, research does show that education (but not necessarily commercial brain training products) can improve working memory and IQ scores—but the improvements are modest: on the order of 2 to 4 IQ points (Bryck & Fisher, 2012; Hambrick, 2014). This is not to say that we won't ever see the development of effective brain training programs—but so far the experts have turned their thumbs down.

Critical Thinking Applied: The Question of Gender Differences

In June 2006, Dr. Larry Summers, the president of Harvard University, lost his job, in part because he opined that factors other than socialization—most notably innate intellectual differences—may account for the undisputed fact that men outnumber women in most scientific fields. (Psychology, incidentally, is an exception!) So, what is really going on? A look at the evidence requires some interpretation—based on your critical thinking skills.

What Are the Critical Issues?

It's the nature–nurture controversy: Are the gender differences we see the result of different ways men and women are socialized? Are they the result of prejudice, discrimination, and lack of opportunity for women who go into science? Or are they the result of different ways that men's and women's brains process information?

Could Bias Contaminate the Conclusion?

Certainly, the first thing that comes to mind is the possibility of bias—on both sides of the issue. In addition to potential problems of "political correctness," we all have a vested interest in making sure our gender doesn't come off looking less smart than the other.

Beyond bias, we should be willing to judge the evidence on its merits and, perhaps, be willing to look at the issue from multiple perspectives. After all, it may be that both sides have a piece of the truth.

What Is the Evidence From the "Nurture" Perspective?

After an extensive review of the literature on gender, Janet Shibley Hyde (2007) points out that men and women are far more similar than different on nearly all dimensions studied—a view she calls the *gender similarities hypothesis.* Similarities include such diverse characteristics as mathematical ability, problem solving, reading comprehension, leadership effectiveness, and moral reasoning. But there are a few exceptions, most of which won't surprise you. These include greater male aggression, acceptance of casual sex, and throwing velocity—differences she allows may have biological roots. In general, however, Hyde favors an explanation that emphasizes the different ways that males and females are socialized. One factor may be the whole set of expectations (and limitations) society offers girls as they are growing up. Hyde says the few physical differences between men and women "are

important mainly because they are amplified by cultural beliefs and roles."

Further, Hyde cautions, many people tend to believe that any male–female differences we may find in the brains of men and women are "hard wired" and unchangeable. Instead, she urges us to see such differences as rooted in the brain's **plasticity**, by which the very fabric of the brain is altered by experience. In fact, brains seem to be changing: The number of women entering scientific fields has surged dramatically in the last decade, with women now making up, for example, half of the graduating classes at U.S. medical schools (Halpern, 2008).

What Is the Evidence From the "Nature" Perspective?

Taking quite a different approach, Roy Baumeister (2007) calls our attention to a different set of facts. He notes that men, as a group, are more *variable* and *extreme* than women—with more men lying at the extreme poles of virtually all mental and behavioral dimensions. Thus, we find more men than women in prisons and homeless shelters and among those with intellectual disability—as well as among jazz musicians, scientists (except in psychology), members of Congress, and people whom we call "geniuses." If men go to extremes more than women, says Baumeister, we would find these gender differences, *and yet the averages could be the same.*

Baumeister is quick to point out that he doesn't see one gender as being better than the other—merely that evolution selected different traits in men and women. In general, he says, cultures give the highest payoffs to men who take risks and have the most extreme skills. These extremists, the risk-takers, are also the ones who tend to have the most children, who perpetuate the trend. The situation is quite different for women, Baumeister argues. The evolutionary pressures for women have emphasized playing it safer than men do—which is the smart thing when your opportunities for leaving offspring are biologically much more limited than are men's.

What Conclusions Can We Draw?

Which side to believe? As we noted earlier, both sides may have part of the truth. Both agree that gender differences in abilities are small. Baumeister suggests the gender differences have more to do with motivation (particularly the male willingness to take risks) than with ability, while Hyde maintains the differences are mainly cultural and, therefore, can be shaped. You will have to decide the issue for yourself, but we urge you, as a critical thinker, to be mindful of your own biases. In the end, this issue may have to be seen from multiple perspectives—rather like the changing views of the **Necker cube**.

Summary: Thinking and Intelligence

Chapter Problem

What produces "genius," and to what extent are the people we call "geniuses" different from the rest of us?

- Although most people think geniuses are different from ordinary people, little evidence exists to support this view.
- Research indicates that "geniuses" are people with ordinary thought processes who have high degrees of motivation, extensive knowledge in their field, and certain personality characteristics.
- In addition to those listed previously, key components in the formula for becoming a genius include seeking out an area for which you have high aptitude and great enjoyment and then spending a minimum of 10,000 hours developing expertise in that area.

What Are the Components of Thought?

Core Concept 6.1

Thinking is a cognitive process in which the brain uses information from the senses, emotions, and memory to create and manipulate mental representations such as concepts, images, schemas, and scripts.

Cognitive scientists often use the **computer metaphor** to conceive of the brain as an information-processing organ. Thinking is a mental process that forms new mental representations by transforming available information coming from various sources, including the senses, emotions, and memory. **Natural concepts** and **artificial concepts** are building blocks of thinking; they are formed by identifying properties that are common to a class of objects or ideas. Concepts are often arranged in hierarchies, ranging from general to specific, but the way they are organized varies across cultures.

Other mental structures that guide thinking include **schemas**, **scripts**, visual imagery, and cognitive maps. Neuroscientists use brain imaging techniques to study the connections between thought processes and the brain—particularly the frontal lobes. At the same time, other scientists have emphasized the role of emotions in thinking, especially in **intuition**. Schemas and scripts assume special importance in understanding thought because they are mental structures that organize concepts, helping us make sense of new information and events—and underlie a sense of humor. Our schemas and scripts are influenced by culture.

What Abilities Do Good Thinkers Possess?

Core Concept 6.2

Good thinkers not only have a repertoire of effective strategies, called algorithms and heuristics, they also know how to avoid the common impediments to problem solving and decision-making.

Two of the most crucial thinking skills involve *identifying the problem* and *selecting a problem-solving strategy.* Useful strategies include **algorithms**, which produce a single correct answer, and **heuristics**, or "rules of thumb." Among the most useful heuristics are *working backward*, *searching for analogies*, and *breaking a bigger problem into smaller problems.* Common obstacles to problem solving include **mental set**, **functional fixedness**, and *self-imposed limitations.*

Judgment and decision-making can be flawed by biases and faulty heuristics. These include the **confirmation bias**, **hindsight bias**, **anchoring bias**, **representativeness bias**, and **availability bias**. Judgment can also be affected by factors outside the person, such as the **tyranny of choice**. In general, good decision makers are those who use good critical thinking skills.

People who are often called "creative geniuses" are highly motivated **experts** who often have a certain cluster of traits, such as independence and a need for stimulating interaction. They appear, however, to use ordinary thinking processes, although the role of natural talent is a subject of dispute.

How Is Intelligence Measured?

Core Concept 6.3

Intelligence testing has a history of controversy, but most psychologists now view intelligence as a normally distributed trait that can be measured by performance on a variety of cognitive tasks.

The measurement of intelligence is both common and controversial. Assessment of mental ability has an ancient human history but was not based on scientific practice until the 20th century. In 1904, Binet and Simon developed the first workable test of intelligence, based on the assumption that education can modify intellectual performance.

In America, IQ testing became widespread for the assessment of Army recruits, immigrants, and schoolchildren. The original IQ calculation was abandoned in favor of standard scores based on the **normal distribution**. Today, IQ tests come in both individual and group forms. They are typically used to diagnose learning disabilities and to assess whether a child is eligible for special education classes. In particular, IQ scores are a key ingredient in identifying **intellectual disability** and **giftedness**, which are often seen as occupying the extremes of the IQ distribution.

Is Intelligence One or Many Abilities?

Core Concept 6.4

Some psychologists believe that intelligence comprises one general factor, *g*, while others believe that intelligence is a collection of distinct abilities.

Among the first *psychometric theories* of intelligence, Spearman's analysis emphasized a single, common factor known as the **g factor**. Later, Cattell separated *g* into two components: **fluid intelligence** and **crystallized intelligence**. Modern cognitive psychologists conceive of intelligence as a combination of several abilities.

In particular, Gardner and Sternberg have taken the lead in extending the definition of intelligence beyond school-related tasks. Sternberg's **triarchic theory** proposes **analytical**, **creative**, and **practical intelligences**, while Gardner's theory of **multiple intelligences** has claimed eight components of intelligence. Meanwhile, cross-cultural psychologists have shown that "intelligence" has different meanings in different cultures. A century of research shows that animals, too, are capable of intelligent behavior, as in chimpanzees that make tools and use language. Recent work also shows that some animals may have a **theory of mind**.

In the United States, much emphasis is placed on mental tests. In such a climate, however, a big danger lies in test scores becoming mere labels that influence people's behavior through the **self-fulfilling prophecy**.

How Do Psychologists Explain IQ Differences Among Groups?

Core Concept 6.5

While most psychologists agree that both heredity and environment affect intelligence, they disagree on the source of IQ differences among racial and social groups.

Hereditarian arguments maintain that intelligence is substantially influenced by genetics, a belief endorsed at one time by the U.S. government, which used IQ tests to restrict immigration early in the 20th century. Environmental approaches argue that intelligence can be dramatically shaped by influences such as health, economics, and education. While most psychologists now agree that intelligence is heritable, they also know that **heritability** refers to variation within a group and does not imply that between-group differences are the result of hereditary factors.

The dispute over the nature and nurture of group differences in intelligence flared again in 1969, when Jensen argued that the evidence favored a strong genetic influence. This argument was echoed in the 1994 book *The Bell Curve*. Critics have pointed out that much of the research cited by those taking the extreme hereditarian position is flawed. In addition, intelligence testing itself may be biased in favor of those with particular language and cultural experiences. Hereditarian claims, however, have stimulated much research, such as Scarr and Weinberg's research on adopted children and follow-up studies of the Head Start program. This research suggests that the racial and class differences in IQ scores can be attributed to environmental differences and to the influence of low expectations and negative stereotypes, as found in **stereotype threat**.

Critical Thinking Applied: The Question of Gender Differences

While the topic of gender differences remains hotly contested, supporters of both sides of the issue agree that the differences—compared to the similarities—are quite small and may be influenced by both nature and nurture.

Additional Video Resources

Here are some additional resources we think you will find both interesting and of personal value to understanding the concepts of thinking and intelligence.

WATCH The Growth Mindset: Believing You Can Improve

Stanford psychologist Carol Dweck explains the powerful differences between people with fixed versus growth mindsets and suggests ways to help children develop a growth mindset. You can view this video here: https://www.ted.com/talks/carol_dweck_the_power_of_believing_that_you_can_improve?language=en

WATCH Are We in Control of Our Decisions?

Duke University Professor Dan Ariely, author of *Predictably Irrational*, explains some provocative findings that show us how our decisions are not always really our own. Watch this video to learn more: http://www.ted.com/talks/dan_ariely_asks_are_we_in_control_of_our_own_decisions

Chapter 7
Development Over the Life Span

How do biology (nature) and our environment (nurture) interact to shape the individual each of us becomes? Even identical twins aren't really identical.

▽ Core Concepts

7.1 Newborns have innate abilities for finding nourishment, avoiding harmful situations, and interacting with others—all of which enable survival.

7.2 Nature and nurture work together to help children master important developmental tasks, especially in the areas of language acquisition, cognitive development, and development of social relationships.

7.3 Adolescence offers new developmental challenges growing out of physical changes, cognitive changes, and socioemotional pressures.

7.4 Nature and nurture continue to interact as we progress through a series of transitions in adulthood, with cultural norms about age combining with new technology to increase both the length and quality of life for many adults.

What could grab media interest more than a story of twins separated at birth and reunited as adults? Many such tales have emerged from psychologist Thomas Bouchard's famous twin-study project at the University of Minnesota. But what really attracts journalists are reports of uncanny similarities between identical twins raised by different parents, taught by different teachers, influenced by different peers and siblings, and sometimes even raised in different cultures.

Take, for example, the "Jim Twins." Separated just a few weeks after they were born, identical twins Jim Springer and Jim Lewis were adopted separately and raised apart. Yet something drove them on parallel paths, even though those paths didn't cross again for 39 years. At their reunion, the "Jim twins" discovered some remarkable similarities in their habits, preferences, and experiences. Some examples:

- They achieved nearly identical scores on tests of personality, intelligence, attitudes, and interests.
- Medically, both have mildly high blood pressure and have had spells that they mistakenly thought were heart attacks; both have had vasectomies; both suffer from migraine headaches.
- Both chain-smoke Salem cigarettes and drink Miller Lite beer.
- Both had been indifferent students: Jim Lewis dropped out in the 10th grade, while Jim Springer managed to graduate from high school.
- Both had been married twice, and both of their first wives were named Linda. Both of their second wives were named Betty. Both men leave love notes around the house.
- Lewis had three sons, including one named James Alan. Springer had three daughters, plus a son named James Allan.
- Both had owned dogs named Toy.
- Both drive Chevrolets, chew their fingernails, like stock-car racing, and dislike baseball.
- Both had been sheriff's deputies.
- Both do woodworking as a hobby. Lewis likes to make miniature picnic tables, and Springer makes miniature rocking chairs. Both had built white benches around trees in their yards.

When he first read about the two Jims in a newspaper, Bouchard knew their case presented a rare opportunity to study the relative effects of heredity and environment and how they unfold over time in the process we call development (Holden, 1980a, 1980b; Lykken and others, 1992). The Jims agreed to participate and thus became the first of some 115 pairs of reunited twins (plus four sets of reared-apart triplets) to be studied over the next 20 years at the University of Minnesota.

Another remarkable pair, Oskar Stör and Jack Yufe, was also separated at birth, and from that point on their lives went in almost unbelievably different directions. Stör was raised by his grandmother in Czechoslovakia and attended a Nazi-run school during World War II, while Yufe was taken to Trinidad and raised as a Jew by his biological father. Oskar is now married, a strong union man, and a devoted skier, while Jack is separated, a businessman, and a self-styled workaholic. Still, alongside these huge differences, researchers found some striking similarities in seemingly trivial behavior patterns. Both twins wear neatly clipped moustaches; both read magazines from back to front; both have a habit of storing rubber bands on their wrists; both flush the toilet before using it; both like to dunk buttered toast in coffee; and both think it is funny to sneeze loudly in public.

> **CHAPTER PROBLEM:** Do the amazing accounts of similarities in twins reared apart indicate we are primarily a product of our genes? Or do genetics and environment work together to influence growth and development over the life span?

As compelling as these stories are, we must interpret them with care (Phelps and others, 1997). Let's begin that interpretation by putting on our critical thinking caps and asking some important questions:

- Are these twin stories representative of all twins reared apart, or are they exceptional cases?
- When we notice striking similarities between biological relatives—whether they be twins, siblings, or parent–child relationships—what factors other than genetics might account for these similarities?
- Are there methods by which we can reliably tease out the differences between the genetic contributions and the influences of the environment to make an accurate determination of the relative contribution of each?

Nature or Nurture: How Do We Know?

These fascinating questions are just part of what we'll explore in our study of human development across the life span. Broadly speaking, **developmental psychology** is the psychology of growth, change, and consistency from conception to death. It asks how thinking, feeling, and behavior change through infancy, childhood, adolescence, and adulthood. It examines these changes from multiple perspectives—physical, emotional, cognitive, and sociocultural. *The primary questions for developmental psychologists, then, are these: How do individuals predictably change throughout the life span, and what roles do heredity and environment play in these changes?*

This issue of heredity and environment is important, so let's take a closer look at it. Psychologists call this the **nature–nurture issue**: *Nature* refers to the contribution of our heredity, whereas *nurture* refers to the role of our environment. In earlier years, the nature–nurture question was an either–or

question, but modern researchers have a more sophisticated understanding of this complex issue (Bronfenbrenner & Ceci, 1994; Dannefer & Perlmutter, 1990). Today, the nature–nurture issue recognizes that both nature and nurture play a role in almost all aspects of human behavior, and it now questions (1) how much each of these factors contributes to various behaviors, and (2) how the two factors may interact to ultimately produce a given characteristic.

What do we mean by interact? Simply put, *nature–nurture interaction* means we are all born with certain predispositions (*nature*) that, if exposed to the proper experiences in our environment (*nurture*), can reach their full potential. If you are good at, say, math or music, your ability likely began with some genetic potential, and then was built upon by your experiences. Heredity establishes your potential, but experience determines if and how your potential will be realized.

Fans of J.K. Rowling's Harry Potter series might recognize this nature-nurture interaction at work in Harry Potter. Born to pure-bloods (parents with magical powers), but raised by Muggles (people without magical abilities), Harry's own magic didn't flourish until he entered the supporting environment of Hogwarts School.

Still, we may ask, "Which of our traits does heredity affect most? And which are most heavily influenced by learning or other environmental factors (such as disease or nutrition)?" More and more information is available to help answer these questions, and we will explore this puzzle throughout this chapter. We must, however, be cautious in our interpretation of these findings. For example, we know that in the genetic disorder known as Down syndrome, biology has a very strong influence. In this condition, the output of abnormal chromosomes leads to intellectual disability—and there is no cure. But this knowledge of the biological cause can be hazardous if parents or teachers of children with such disorders erroneously conclude that if biology is the cause, then nothing can be done to help. By focusing on the genetic side of the disorder, they risk overlooking effective learning-based treatments that can measurably improve the living skills and abilities of individuals with this disorder. The science of **epigenetics** now reveals new insight into how environmental influences leave a physical imprint on our genetic underpinnings, thus validating the important role of the environment even further.

Mindful of such dangers, psychologists have nonetheless forged ahead in the study of hereditary and environmental contributions to thought and behavior. To do so, they have invented several clever methods for weighing the effects of nature and nurture. **Twin studies** represent one such method. The work of Thomas Bouchard, for example, offers some tantalizing clues about the relative contribution of nature and nurture: In this type of situation, any similarities between the two are likely a result of shared heredity, since they did not share a common environment growing up. This type of twin set, however, is a scarce resource. Far more common are twin

sets raised together, and fortunately, psychologists have figured out how to learn from these twins as well. Because *identical twins* have essentially the same **genotype** and *fraternal twins* have (on the average) only 50% of their genes in common, hereditary effects show up more strongly in identical twins. (In studies comparing these two twin types, the fraternal twins serve as a sort of **control group**.) Such studies have given us valuable information on the role of genetics in a variety of mental and behavioral disorders, including alcoholism, Alzheimer's disease, schizophrenia, depression, and autism (Muhle and others 2004; Plomin and others, 1994).

Another method used to measure the effects of heredity and environment involves **adoption studies**. If you adopted a baby, whom would he or she resemble most as an adult: you, or the biological parents? Researchers in adoption studies compare the characteristics of adopted children with those of their biological and adoptive family members. Similarities with the biological family point to the effects of nature, while similarities with the adoptive family suggest the influence of nurture. This work, in concert with twin studies, has revealed genetic contributions to a variety of psychological characteristics such as intelligence, sexual orientation, temperament, and impulsive behavior—all of which we will learn about in more detail in the pages to come (Alanko and others, 2010; Bouchard, 1994; Dabbs, 2000).

Key Question: What Innate Abilities Does the Infant Possess?

Core Concept 7.1

Newborns have innate abilities for finding nourishment, avoiding harmful situations, and interacting with others—all of which enable survival.

People used to think babies began life as a "blank slate"—with an empty brain and no abilities. In modern times, however, that picture has changed. We now see that newborns possess a remarkable set of abilities acquired through their genes. They are adept at locating food and avoiding potential harm, and their social nature facilitates their survival as well. We focus on these inborn or *innate abilities* in our core concept, which notes:

> Newborns have innate abilities for finding nourishment, avoiding harmful situations, and interacting with others—all of which enable survival.

To be sure, the newborn's capabilities are limited, but they are effective enough to promote survival. You arrived in the world already "knowing," for example, how to get nourishment by suckling, how to raise your hands to

shield your eyes from bright light, and how to get attention by cooing and crying. Still, it is helpful to think of the newborn's basic abilities as a sort of scaffold to which new and more complex abilities are added as the child grows and develops.

To explain where these abilities come from and how they develop, we will organize our discussion around three important developmental periods: the prenatal period, the newborn or neonatal period, and infancy. You will notice that, in each phase, development builds on the abilities and structures laid down earlier.

By the end of this section, you will be able to:

7.1 **Describe the phases of prenatal development**

7.2 **Explain how reflexes and abilities present at birth effectively help newborns survive and thrive in their environment**

7.3 **Discuss how nature and nurture interact in infant development**

7.1: Prenatal Development

Objective: **Describe the phases of prenatal development**

The **prenatal period** is a time of furious developmental activity between conception and birth that readies the organism for life on its own outside the womb. Development typically occurs over the span of 9 months and is divided into three phases: the germinal, embryonic, and fetal stages.

7.1.1: Three Phases of Prenatal Development

1. **Germinal Phase:** Shortly after conception, the fertilized egg, also known as a **zygote**, begins to grow through cell division. During this *germinal phase,* one cell becomes two; two become four; and when the number reaches about 150—a mere week or so after conception—the zygote implants itself in the lining of the uterus. At this point, it (along with cells that will form the *placenta* and other supportive structures) becomes an **embryo**. It is now connected to the mother's body and thus affected by anything she eats or drinks or to which she is otherwise exposed.

2. **Embryonic Phase:** During the *embryonic phase,* the genetic plan determines how all the organs that will ultimately be part of the newborn start to form. In a process known as differentiation, the embryo's cells begin to specialize as components of particular organ systems. (Before differentiation, certain cells in the embryo, known as embryonic stem cells, are capable of forming into any organ of the body.) One example of differentiation is the development of anatomical

As the brain grows in the developing embryo, it forms as many as 250,000 new neurons per minute!

sex: If the embryo's genetic plan contains two X chromosomes, the child will be female, but if it contains an X and a Y chromosome, a male will develop.

3. **Fetal Phase/Stage:** After the eighth week, the developing embryo is called a **fetus**. In the *fetal stage,* spontaneous movements and basic reflexes begin to appear. For example, as early as 14 weeks, some babies can be seen on ultrasound to curve their hands around something that comes in contact with their palm (Sparling and others, 1999). This is the beginning of the grasping reflex, and it has **adaptive** significance. (Think about it: How might an infant be better able to survive if she automatically grasps things with which she comes in contact?). By the 16th week, the brain is fully formed and the fetus can feel pain (Anand & Hickey, 1987). The baby can hear sounds from outside the womb by the 27th week, enabling the ability to recognize certain sounds and rhythms shortly after birth. The brain will continue to develop, growing new neurons at an amazing rate of up to 250,000 per minute. At birth, the newborn's brain contains some 100 billion neurons (Dowling, 1992).

7.1.2: Teratogens: Prenatal Toxins

During prenatal development, the **placenta** is the organ that surrounds the embryo/fetus. It serves as a conduit between mother and child, letting nutrients in and waste out, and it can also screen out some—but not all—potentially harmful substances. Some toxic substances, called **teratogens**, still get in and can cause irreparable damage. Teratogens include viruses (such as HIV, the AIDS virus), certain drugs and other chemicals, and even some herbs. Among the most common teratogens are nicotine and alcohol.

Fetal alcohol syndrome (FAS) can occur in children of mothers who drink alcohol during pregnancy. A leading

cause of intellectual disability, FAS may also cause babies to have poor motor coordination, impaired attention, and hyperactivity. Mothers who consume one or more drinks per day risk fetal alcohol exposure, which has been found to impair development of language ability, memory, learning, and a host of other cognitive and physical functions (Office of the Surgeon General, 2005). Furthermore, a series of studies at the University of Pittsburgh indicates that even minimal exposure—in some cases fewer than five drinks per week—can result in lower IQ and significantly retarded physical development: At age 14, children who had been exposed to even light alcohol consumption in utero weighed on average 16 pounds less than children whose mothers had abstained from alcohol during pregnancy (Day, 2002; Willford, 2006). The take-home message? There is no "safe" amount of alcohol any time during pregnancy (Centers for Disease Control and Prevention, 2015). Via the placenta, the fetus absorbs the alcohol in the same measure as the mother does, but without a functioning liver or other organs to metabolize it. During this critical time of rapid brain and body development, even a small amount can pose a risk.

Exposure to nicotine, as well as some commonly taken herbs and supplements, can also damage the developing fetus. Women who smoke during pregnancy are more likely to have children with lower birth weight, learning deficits, and ADHD (Button and others, 2005). Maternal smoking is also associated with greater risk of sudden infant death syndrome (SIDS; Bruin and others, 2007). Even some popular herbal remedies and supplements, such as gingko and ginseng, have been found to have detrimental effects on a developing fetus (Chan and others, 2003; Dugoua and others, 2006).

7.2: The Neonatal Period: Abilities of the Newborn Child

Objective: **Explain how reflexes and abilities present at birth effectively help newborns survive and thrive in their environment**

By the time a newborn arrives in the world, then, a great deal of neural and sensory development has already taken place. (The term **neonatal period** refers to the first month after birth.) This current understanding of the newborn's sensory awareness is a far cry from the "great blooming, buzzing confusion" experts once thought characterized the newborn's world (James, 1890/1950). Indeed, more recent research has revealed that newborns have all five senses working, as well as a variety of behavioral reflexes they use to respond to and manipulate their environment. Together, these many abilities effectively help newborns survive and thrive in their environment.

7.2.1: Innate Reflexes

Babies are born with a remarkable set of **innate reflexes** providing a biological platform for later development. Among these reflexes, the *postural reflex* allows babies to sit with support, and the *grasping reflex* enables them to cling to a caregiver. The *rooting reflex* is apparent when newborns turn their heads toward anything that strokes their cheeks—a nipple or a finger—and begin to suck it. And if you have ever noticed that when you hold a baby upright over a solid surface, her legs will lift up as if she were marching, you've witnessed the *stepping reflex,* which helps prepare a baby to walk. There are also a number of reflexes that act as built-in safety features to help them avoid or escape from loud noises, bright lights, and painful stimuli. And in their cooing, smiling, and crying, babies have perhaps their most effective tools for building social relationships. All of this, of course, makes much evolutionary sense because these abilities are highly adaptive and promote survival.

7.2.2: Sensory Abilities in the Newborn

How do sensory abilities in newborns aid their survival? For one thing, they can respond to taste: the sweeter the fluid, the more continuously and forcefully an infant will suck (Lipsitt and others, 1976). For another, they smile when they smell banana essence, and they prefer salted to unsalted cereal (Bernstein, 1990; Harris and others, 1990). They recoil, however, from the taste of lemon or shrimp and the smell of rotten eggs. And, as early as 12 hours after birth, they show distinct signs of pleasure at the taste of sugar water or vanilla. All these responses are part of the newborn's innate ability to seek nourishment—as the Core Concept for this section suggests.

Just as heredity biases newborns' tastes, it also programs a preference for human faces to most other visual patterns (Fantz, 1963). Even their neonatal nearsightedness helps: Their optimal focus of about 12 inches is ideally suited for looking at faces. By just a few days after birth, neonates recognize their mother's face. Their distance vision, however, is poor, with a visual acuity of about 20/500 (which means that they can discriminate at 20 feet stimuli that most older children can see clearly at 500 feet). These immature systems develop very rapidly (Banks & Bennett, 1988), however, and by about 7 weeks, infants' visual pathways and motor coordination enable them to maintain eye contact with a caregiver—an important element in establishing a relationship.

What else can newborns do with their senses? Although they can see colors, their ability to differentiate colors, such as red from orange from blue, becomes dramatically better a month or two after birth (Teller, 1998).

They also prefer to look at objects with a high degree of contrast, such as checkerboards, or target shapes. By 3 months, babies can perceive depth and are well on their way to enjoying the visual abilities of adults.

Moreover, it may surprise you to know that infants seem to possess a basis awareness of numbers. In one clever study, infants watched dolls being put into and taken out of a display case. When the display case contained either more or fewer dolls than it had when the infants had previously seen it, they gazed longer at that case, indicating greater interest in an unexpected outcome—as if they were trying to figure out something that didn't make sense (Wynn, 1992, 1995).

Additional studies confirm this intuitive number sense, finding that babies as young as 6 months can, for example, recognize the difference between a screen with 10 dots and a screen with 20 dots on it (Starr and others, 2013). (See the video link at the end of this chapter to watch for yourself!) What's more, at age 3, the children who had the best intuitive number sense at 6 months of age scored significantly higher on basic math tests (such as "If Johnny has one cookie and his mom gives him three more, how many cookies does Johnny have?"). Thus, the basic number awareness that seems to be innate serves as the foundation for the later development of more complex skills, such as those required for arithmetic (Spelke, 2000). Infants share this intuitive number awareness with primates and a variety of other animal species, which makes evolutionary sense—after all, wouldn't it be helpful to be able to recognize whether the predators outnumbered your own group?

Infants saw two slide sets that changed rapidly: slides on the right always had 10 dots, and slides on the left alternated between 10 and 20 dots. Infants who recognized the difference (by looking more at the alternating dots) had higher math scores when tested later at age 3.

Newborns also have strong auditory preferences, preferring human voices over other sounds, and the sounds and rhythms of their own language to nonnative languages (Goodwyn & Acredolo, 2000). Before assuming these preferences are genetic, though, we must recall that the developing fetus can hear sounds from outside the womb during the last few months in utero. Thus, an alternate interpretation is that these auditory preferences result from prior exposure to human voices in their native language. To test whether these preferences are genetic or environmental, one study had expectant mothers read *The Cat in the Hat* aloud twice a day for the last 6 weeks of their pregnancy; then, after the babies were born, the researchers played audiotapes of the mothers reading that story as well as a different story. The findings? Babies expressed an overwhelming preference for the sound of the familiar story being read over the sound of a different story. Neonates also display greater attraction to female voices than to those of men, and within a few weeks of birth they begin to recognize their mothers' voice (Carpenter, 1973; DeCasper & Spence, 1986). Thus, nurture—by way of prior experience—may be the driving force behind these newborn auditory preferences.

7.2.3: Social Abilities

Have you ever noticed that if you stick your tongue out at a baby, he will stick his tongue out back at you (Meltzoff & Moore, 1983, 1989)? This delightful game reveals just one of many behaviors newborns and infants will mimic. While in the past, some child development experts wondered if this reflected an in-depth cognitive understanding of the other person's behavior, the recent discovery of **mirror neurons** offers a more likely explanation. **Mimicry** of a variety of behaviors, like other innate abilities we have discussed, helps the infant survive and thrive in the environment.

As the foregoing discussion suggests, infants are built for social interaction. In fact, they not only respond to, but also interact with, their caregivers from the moment of birth. Film studies of this interaction reveal an amazing degree of **synchronicity** (Martin, 1981). And while babies respond and learn, they also send out their own messages to those willing to listen to and love them. The result of this interaction is seen in studies showing how the expressions of mothers and infants are coordinated (Fogel, 1991). So, a 3-month-old infant may laugh when her mother laughs and frown or cry in response to her display of negative emotion (Tronick and others, 1980). These early interactions, the combined result of nature (mirror neurons) and nurture (positive reinforcement gained from mimicry), form some basis for the later development of empathy.

7.3: Infancy: Building on the Neonatal Blueprint

Objective: **Discuss how nature and nurture interact in infant development**

Following the neonatal period, the child enters **infancy**, a period that lasts until about 18 months of age—the time when speech begins to become better developed. (The Latin root *infans* means "incapable of speech.") It is a time of rapid, genetically programmed growth and still-heavy reliance on the repertoire of reflexes and "instinctive" behaviors that we discussed earlier. All of these abilities arise from a nervous system that continues to develop at a breathtaking pace.

7.3.1: Neural Development

While the prenatal brain focused on producing new brain cells, many of those neurons are not fully connected to each other at birth. To create and consolidate the connections, stimulation from the environment assumes a critical role. Each time an infant is exposed to a new stimulus, dendrites and axons actually grow and branch out to facilitate connections between the neurons involved in that experience (Kolb, 1989). The more frequently the fledgling neural connections are utilized, the more permanent they become. In other words, "neurons that fire together, wire together" (Courchesne and others, 1994).

As the dendrites and axons grow and connect, the total mass of neural tissue in the brain increases rapidly—by 50% in the first 2 years, and nearly doubling by age 4. For the next 10 years, the types of experiences the infant is exposed to will largely determine which regions and functions of the brain become most developed. The more an infant or child is exposed to a particular experience, whether it be reading, sports, music, canoe-building, farming, or fishing, the stronger and denser the brain regions associated with that activity will become. As you might surmise, this is an adaptive process—the more time spent on these activities, the better equipped the brain and body become in that domain, thus preparing the individual for success in that particular environment.

SYNAPTIC PRUNING   The genetic program (along with physical limitations imposed by the size of the skull) does not allow the tremendous growth of brain circuitry to continue indefinitely, however. By about 11 years of age, unused connections begin to be trimmed away in a process called **synaptic pruning**. Just as gardeners prune trees and bushes to promote healthier growth for the strongest limbs, our brain naturally prunes away the weakest and unused synapses so that energy can be directed toward further building of the strongest and most frequently used connections. In this way, nature and nurture interact to develop a neural

system uniquely suited to our survival in the environment to which we are exposed.

How important is the pruning process? New research on mice (whose neural systems are remarkably similar to those of humans) indicates that when the pruning process doesn't occur normally, existing synapses appear to be weaker, and there are more of them, which seems to create "neural noise" and impede communication between neurons (Zhan and others, 2014). Mice with this condition avoid social interactions and engage in repetitive behaviors—which are two common symptoms of **autism spectrum disorders (ASD)**. Researchers are quick to point out that there appear to be a variety of contributors to ASD, so if a faulty pruning process does contribute, it isn't the only cause (Yong, 2014). Nonetheless, the new findings are promising clues in the search for neural underpinnings of not only autism, but also schizophrenia and obsessive–compulsive disorder.

SENSITIVE PERIODS   The early years are the most fertile time for brain development. **Plasticity**, the brain's ability to rewire itself to adapt to its environment, is greatest during this time and gradually declines throughout our life. In fact, in some domains stimulation *must* occur during a specific "window of opportunity," or the ability will not develop normally (Lewis & Maurer, 2005; Trainor, 2005). This is called a **sensitive period** in development. Optimal development of the neural capacity to process language, for example, is contingent on exposure to language in the first few years of life. Peak proficiency in a language most often occurs in people who were exposed to the language in infancy or very early childhood. That sensitive period starts to close as early as age 4 or 5, after which language development becomes gradually more difficult (Newport and others, 2001). These findings apply both to spoken and signed language: One study examined adults who were born profoundly deaf, and found that those who did not learn American Sign Language (ASL) until adolescence or adulthood never reached the same level of competency in the language as did those who learned it in early childhood (Mayberry, 1991; Singleton & Newport, 2004). Similarly, if you ever tried to learn a new language as a teen or adult, you probably found it far more difficult than it would have been if you'd learned it as a child. Sensitive periods exist for other abilities as well, including hearing and vision, and even emotional responses: Without positive interactions early in life with a caregiver, a child will not develop the normal capacity for adaptive social relationships (Knudsen, 2004).

7.3.2: The Genetic Leash

Sitting, crawling, and walking—like the growth of the brain, the growth spurt of puberty, and the onset of menopause—all occur on their own biological time schedules.

Psychologists use the term **maturation** for the genetic contributions to these processes of growth and development over time. When organisms are raised under adequate environmental conditions, their maturation follows a predictable pattern. In humans, maturation generates all the sequences and patterns of behavior seen in Figure 7.1.

Figure 7.1 Maturational Timetable for Motor Control

Birth

1 month

Responds to sound
Becomes quiet when picked up
Vocalizes occasionally

2 months

Smiles socially
Recognizes mother
Rolls from side to back
Lifts head and holds it erect and steady

3 months

Vocalizes to the smiles and talk of an adult
Searches for source of sound
Sits with support, head steady

4 months

Gaze follows dangling ring, vanishing spoon,
   and ball moved across table
Sits with slight support

5 months

Discriminates strangers from familiar persons
Turns from back to side
Makes distinctive vocalizations
   (e.g., pleasure, eagerness, satisfaction)

6 months

Lifts cup and bangs it
Smiles at mirror image
Reaches for small object

7 months

Makes playful responses to mirror
Sits alone steadily
Crawls

8 months

Vocalizes four different syllables (such as da-da, me, no)
Listens selectively to familiar words
Pulls to stand

9 months

10 months

Plays pat-a-cake

11 months

Stands alone

1 year

Walks alone

We must, however, keep in mind the role of the environment and its interaction with our hereditary nature. While maturation dictates the general time frame in which an individual becomes biologically ready for a new phase, the environment can speed up or slow down the exact time of development. Prominent biologist Edward Wilson (1998, 2004) describes this principle as a **genetic leash**. Because of maturation, for example, most children will learn to walk following a time-ordered pattern typical of all physically capable members of our species. Thanks to the genetic leash, however, children who receive extra help from their environment can learn to walk up to several months earlier. This finding is illustrated in several African cultures where parents make a habit of bouncing babies on their feet, which speeds development of their leg muscles and motor control (Gardiner and others, 1998). And at the other extreme, children in Iranian orphanages who received little human contact and little opportunity to leave their cribs were significantly slower in learning to walk (Dennis, 1960). In both these ways, support (or lack of support) from the environment influence the typical pace of maturation—but only to the limits imposed by the genetic leash. No amount of bouncing will make a baby walk in the first few months of life.

The concept of the genetic leash will remain useful as we continue to study various patterns of human development. It eloquently illustrates the inescapable interaction between nature and nurture so fundamental to understanding how and why we develop as we do. We will see examples of this interaction throughout our study of language and cognitive development, social development, moral development, and emotional development—and moreover, in all major stages of the human life span.

WRITING PROMPT

The Genetic Leash

To stretch your understanding of how the genetic leash operates in an individual's life, choose one of the motor functions in the preceding slideshow, and suggest one thing an adult could do with the child to speed up development of that particular ability.

▶ `The response entered here will appear in the performance dashboard and can be viewed by your instructor.`

`Submit`

7.3.3: The Effects of Poverty on Development

In 2015, a landmark study of more than 1000 children and teens produced a stunning headline. "Poverty Shrinks the Brain," decreed the scientists who conducted DNA and brain scans to search for neural differences related to family income. Recognizing that genetics, ancestry, and parental education can all influence cognitive outcomes, scientists collected that data first to remove it from the equation. After doing so, and controlling for other possible contributing factors, children from the lowest income bracket still had 6% less brain mass than children from the highest income brackets (Noble and others, 2015). In children from the poorest families, an income difference of even a few thousand dollars led to major differences in brain structure, especially in areas associated with language, reading, decision-making skills, and learning.

While scientists and educators have long known that children from disadvantaged families often struggle more in school, this is the first large-scale study to isolate the specific effects of poverty, separate from other factors. And, since genetic contributors were factored out, environmental influences such as nutrition, health care, school environment, and air quality—all known to effect brain development—are the likely culprits underlying the neural deficits. The good news? There is evidence that interventions can help reverse the decline. One program in Mexico, which provided cash supplements to low-income families, discovered direct positive impacts on the cognitive skills, language development, and physical health of the children in the families (Fernald and others, 2008). Researchers hope these newest findings will help improve access to healthy school lunches, quality after-school programs, and health care. "We know that experiences in the environment impact the way the brain wires itself through childhood and adolescence," investigator Elizabeth Sowell said in an interview after the study's findings hit the news (Gregoire, 2015). "If we could somehow enrich the environments of particularly the poorer children, we might be able to change that trajectory to equalize it, to some extent."

Nutrition plays a key role in the relationship between poverty and brain development. New research from the University of Waterloo (2014) reveals that children who are undernourished in their first 3 years show deficits in cognitive skills and also in their physical development, compared to kids with better nutrition. And the differences have long-term economic implications: As adults, these kids earn lower wages and suffer from more health problems, which impacts not only their own lives and outcomes, but the national economy of the country in which they live. Economists have calculated the benefits to a government for investing in childhood nutrition, and found that a single dollar spent on a child's nutrition reaps up to $166 in earnings when that child reaches adulthood!

7.3.4: Contact Comfort

As infants develop greater sensory and motor abilities through both nature and nurture, they rely on caregivers to provide the necessary stimulation. One type of stimulation

we haven't yet discussed is the importance of touch. In the first half of the 19th century—and this may be hard for you to believe—many experts assumed infants sought physical contact with their caregivers only as a means to an end (with the end being food or nourishment). Beyond providing the necessary nourishment, these "cupboard theory" proponents argued, infants derived no further benefit from physical contact. Psychologists Harry and Margaret Harlow disagreed (Harlow, 1965; Harlow & Harlow, 1966) and tested their theory using infant monkeys separated from their mothers at birth. The Harlows placed orphaned baby monkeys in cages where they had access to two artificial surrogate mothers. One was a simple wire figure that provided milk through a nipple—a "cupboard," but little else. The other was a cloth-covered figure providing no milk but offering abundant stimulation from its soft terry-cloth cover. The results? Despite the nourishment provided by the wire model, the baby monkeys spent little time with it, preferring instead to remain nestled to the cloth mother. Moreover, when the infant monkeys were frightened, they sought comfort by clinging to the cloth figure. They also used it as a base of operations when exploring new situations. With these observations, then, the Harlows were able to demonstrate that infant monkeys become attached to and prefer a "mother" figure that provides **contact comfort**, the stimulation and reassurance derived from physical touch.

One of Harlow's monkeys, clinging to the artificial terrycloth mother that provided contact comfort. Next to it, you can also see the wire mother that provided milk but no contact comfort. This was the first study to demonstrate the importance of **contact comfort**.

Human infants need contact comfort, too. Since the Harlows' groundbreaking study, we have learned much about the human need for touch. University of Miami developmental psychologist Tiffany Field first experimented with massage on premature babies in 1986 and found that daily moderate-pressure massage resulted in faster weight gain, improved digestive tract functioning, and better social responsiveness than were shown by premature babies who did not receive massage (Field and others, 2010). Those infants who received massage were released from the hospital, on average, 6 days earlier than those who did not, and a year later, showed greater intellectual and motor skills development—indicating that the benefits of early massage persisted well beyond treatment. Another study found that infants who were massaged cried less, slept better, and had lower levels of stress hormones than babies who did not receive massage (Underdown and others, 2006).

How does massage provide such significant benefits? What do you think?

Though the mechanics are not yet fully understood, one recent study took initial blood samples from participants, then either gave them a 15-minute massage or let them rest quietly for the same period of time. When they took a second set of blood samples after the 15-minute period, participants in the massage group had lower levels of stress hormones and higher levels of **oxytocin** than they had in the initial blood draw (Morhenn and others, 2012). These findings support other studies that have demonstrated that touch lowers the heart rate and helps the stress response system return to normal more quickly after being triggered by threat or danger. Dovetailing with these studies highlighting the benefits of touch is research documenting negative outcomes in children who are abused or neglected (Glaser, 2003). Clearly, a close, interactive relationship with loving adults is a child's first step toward healthy physical growth and normal socialization (Blum, 2002; Sapolsky, 2002).

7.3.5: Attachment

Psychologists refer to the establishment of a close emotional relationship between a child and a parent figure as **attachment**. This relationship is especially important because it lays the foundation for other close relationships that follow throughout a person's lifetime (Cassidy & Shaver, 2008).

Attachment appears to occur instinctively in many species, although it is not necessarily limited to the infant's interactions with the biological parents. One striking example is **imprinting**, the powerful attraction of infants of some species (notably in birds) to the first moving object or individual they see. A baby chick hatched by a mother duck will form an attachment to its surrogate mother—even though it is a chicken, not a duck. The imprinted chick will even follow its duck-mother right up to the water's edge when she and her ducklings go for a swim. (This scientific concept was illustrated in Hans Christian Andersen's story "The Ugly Duckling.") Thus, tendency to imprint is **innate**, although the environment determines what form it will take.

In humans, research on contact comfort provided early evidence of the physical need for attachment. Building on the Harlows' work with monkeys, psychologist John Bowlby (1969, 1973) suggested human attachment is also innate, beginning as early as the first few weeks and functioning as a survival strategy for infants. From an evolutionary perspective, it stands to reason that infants who stay close to their caregivers would be less vulnerable to threats from the environment. One study found, for example, that when mothers left the room, their 2- to 4-month-old babies' skin temperature dropped, a sign of emotional distress (Mizukami and others, 1990). In these youngsters, skin temperature dropped even more when a stranger replaced the mother. In contrast, skin temperature remained steady if the mother stayed in the room—even if the stranger was present. Apparently, children only a few months old rely on their caregivers as a "safe place," even before they can indicate attachment by walking or crawling (Bee, 1994).

ATTACHMENT STYLES   Have you ever noticed, though, that children seem to differ in their levels of attachment? Some children seem comfortable with strangers when their primary caregiver is present, while others appear clingy and fearful. Still others seem to care very little who is present. Developmental psychologist Mary Ainsworth not only noticed those patterns but also spent a career studying the various forms attachment takes in humans. To do so, she developed an innovative laboratory procedure called the "Strange Situation," which continues to be used today as the standard for measuring attachment.

What is this clever procedure? The Strange Situation involves putting young children and their primary caregiver into a series of interactions—sometimes together, sometimes separated, and sometimes with a stranger. Researchers then observe how the child responds to these various situations, paying special attention to the child's behavior when the caregiver returns from a short separation (Ainsworth, 1989; Lamb, 1999). Using such methods in a variety of cultures, Ainsworth found that children's responses fell into two main categories, reflecting either **secure attachment** or insecure attachment. *Securely attached* children were relaxed and comfortable with their caregivers and tolerant of or even interested in strangers and new experiences. When separated from their caregivers, they became upset—which, from 6 to about 20 months, is a normal behavior called **separation anxiety**—but calmed down quickly on the caregiver's return and resumed their normal activities. They seemed to perceive their caregivers as a "secure base" from which to explore the world, confident the caregiver would be available to help if needed.

Insecurely attached children could be divided into two categories: anxious-ambivalent and avoidant. Both

become upset when the caregiver leaves the room—just like the secure child—but the difference lies in how they respond when the caregiver returns. The **anxious-ambivalent** children wanted contact with their caregivers but proved difficult to console when reunited, remaining upset despite the caregiver's attempts to soothe them. They also clung anxiously to their caregivers when a stranger approached and were uncomfortable exploring new situations. Conversely, the **avoidant** children refused to engage with their caregivers upon return, often avoiding eye contact and refusing the caregivers' attempts to interact. Overall, some 65% of American children develop secure attachment, while about 20% are avoidant, and 15% are anxious-ambivalent (Berk, 2007).

WATCH Secure, Anxious, and Avoidant Babies in Action

Watch a key portion of the Strange Situation procedure, so you can see for yourself how babies with differing types of attachment respond to the return of their mothers. You can view this video here: https://www.youtube.com/watch?v=DH1m_ZMO7GU

Attachment has become a very hot topic over the past decade, as a burgeoning body of research indicates that patterns established in infancy affect a variety of childhood and adult behaviors, including aggression, friendships, job satisfaction, relationship choices, and intimacy experiences (Berk, 2004; Gomez & McLaren, 2007).

But what causes a child to develop a particular attachment style? What do you think?

For many years, nurture was presumed to be the culprit: Specifically, psychologists thought that sensitive and responsive parents produced securely attached children, while inconsistent parenting produced anxious-ambivalent children, and neglectful parenting led to avoidant attachment. And the environment certainly does a play a role: Romanian orphans were much more likely to develop secure attachment styles when they were placed in a foster home before 24 months of age, as compared to orphans raised in standard orphanage care (Smyke and others, 2010). Thus, there also seems to be a sensitive period for development of attachment style.

Today, though, most researchers recognize that nature and nurture interact in the development of attachment style. Infant temperament, for example, which is largely genetic, influences how easy or difficult it is to be responsive to an infant. It is not surprising, then, that one study found that babies who were fussier in the first few days of life were more likely to have an anxious-ambivalent attachment style 1 year later (Miyake, 1993). This seems quite logical, as most parents would have more difficulty consistently "reading" the signals from a temperamental baby than from an easy baby, thus creating an interaction effect between infant temperament and parenting style.

CULTURE AND ATTACHMENT   Before making up your mind about which attachment style is "best," though, consider the important factor of culture. Did you assume, like

many Americans do, that secure attachment is the ideal? On the contrary, German families prefer avoidant attachment, as it promotes greater self-sufficiency, while Japanese parents rarely leave their children unattended, fostering greater dependence and an accompanying anxious-ambivalent attachment style (Grossman and others, 1985; Miyake and others, 1985). Like many qualities, then, the judgment of which is "ideal" depends heavily on the prevailing values of the culture.

LONG-TERM EFFECTS OF ATTACHMENT And attachment isn't just for kids. As children grow up and become adults, they no longer restrict their attachment to their primary caregiver: They gradually widen their attachments to include other family members, friends, teachers, co-workers, and others in their community. Evidence suggests the primary attachment relationship, though, continues to serve as an internal working model for later important relationships. In other words, whatever the child learns to expect in that first caregiver relationship becomes the lens through which later relationships are perceived and interpreted. Securely attached children are likely to be well adjusted and interact easily with others, whereas anxious-ambivalent children often turn into suspicious adults, and avoidantly attached children are least likely to form close emotional bonds with others. Attachment style, then, continues to be a predictor of intimate relationships in adulthood.

We should emphasize, however, that—powerful as attachment is—individuals who lack healthy attachments in infancy and childhood are not necessarily doomed to failure in life. While attachment problems are good predictors of later problems with social relationships, many people succeed in overcoming attachment difficulties (Kagan, 1996, 1998). Healthy relationships, later in childhood or even in adulthood, can "reset" the working model. With such caveats in mind, we now invite you to take the quiz in the *Do It Yourself!* box, "What's Your Attachment Style?"

Do It Yourself!
What's Your Attachment Style?

Which of the following three self-descriptions do you most agree with (adapted from Shaver & Hazan, 1994)?

1. I am somewhat uncomfortable being close to others; I find it difficult to trust them completely, difficult to allow myself to depend on them. I am nervous when anyone gets too close, and love partners often want me to be more intimate than I feel comfortable being.

2. I find that others are reluctant to get as close as I would like. I often worry that my partner doesn't really love me or won't want to stay with me. I want to get very close to my partner, and this sometimes scares people away.

3. I find it relatively easy to get close to others and am comfortable depending on them. I don't often worry about being abandoned or about someone getting too close to me.

What Your Choice Means

We realize that it is probably obvious to you which of the preceding statements is "best"—at least, from an American perspective. Nevertheless, just considering the alternatives should help you understand attachment styles—and, perhaps, yourself—a little better. Here's our interpretation:

1. If you selected the first statement, you agreed with the attitude that reflects an avoidant, insecure attachment. In original research investigating attachment style in adults, this style was chosen by 25% of respondents (Hazan & Shaver, 1990.

2. The second statement reflects an anxious-ambivalent, insecure attachment style, selected by 20% of the sample.

3. The third statement reflects a secure attachment style, the most common pattern identified, accounting for 55% of respondents (Shaver & Hazan, 1994).

What Do These Styles Imply?

Through interviews, observations, and questionnaires, psychologists have identified several correlates of attachment style in adulthood (Ainsworth, 1989; Collins & Read, 1990; Hazan & Shaver, 1990; Kirkpatrick & Shaver, 1992; Shaver & Hazan, 1993, 1994; Simpson, 1990):

- Secure individuals have more positive self-concepts and believe that most other people are good natured and well intentioned. They see their personal relationships as trustworthy and satisfying.

- Secure respondents are satisfied with their job security, co-workers, income, and work activity. They put a higher value on relationships than on work and derive their greatest pleasure from connections to others.

- Insecure, anxious-ambivalent persons report emotional extremes and jealousy. They feel unappreciated, insecure, and unlikely to win professional advancement. They make less money than those with other attachment styles, working more for approval and recognition than financial gain. They fantasize about succeeding but often slack off after receiving praise.

- Avoidant people fear intimacy and expect their relationships to fail. They place a higher value on work than on relationships and generally like their work and job security. They follow a workaholic pattern, but (not surprisingly) they are dissatisfied with their co-workers.

- Secure individuals tend to choose as partners others who are secure. After breakups, avoidant individuals claim to be less bothered by the loss of the relationship, although this may be a defensive claim, with distress showing up in other ways (e.g., physical symptoms).

Table 7.1 Erikson's Psychosocial Stages

Age/Period (approximate)	Principal Challenge	Adequate Resolution	Inadequate Resolution
0–1½ years	Trust vs. mistrust	Basic sense of safety, security; ability to rely on forces outside oneself	Insecurity, anxiety
1½–3 years	Autonomy vs. shame or self-doubt	Perception of self as agent; capable of controlling one's own body and making things happen	Feelings of inadequacy about self-control, control of events
3–6 years	Initiative vs. guilt	Confidence in oneself as being able to initiate, create	Feelings of guilt over one's limitations or inabilities
6 years to puberty	Industry vs. inferiority	Perceived competence in basic social and intellectual skills; self-acceptance	Lack of self-confidence; feelings of failure
Adolescence	Identity vs. role confusion	Comfortable sense of self as a person, both unique and socially accepted	Sense of self as fragmented, shifting, unclear sense of self
Early adulthood	Intimacy vs. isolation	Capacity for closeness and commitment to another	Feeling of loneliness, separation; denial of intimacy needs
Middle adulthood	Generativity vs. stagnation	Focus of concern beyond oneself, to family, society, future generations	Self-indulgent concerns; lack of future orientation
Late adulthood	Ego-integrity vs. despair	Sense of wholeness; basic satisfaction with life	Feelings of futility, disappointment

7.3.6: Psychosocial Development: Trust versus Mistrust

The large body of research on attachment dovetails nicely with the first stage in one of the major life span theories of development. Erik Erikson (1902–1994) was a prominent psychoanalyst who believed that, on an unconscious level, we form basic beliefs about ourselves and our relationship to others as we go through life. These basic beliefs influence our development through the choices we make in our relationships. Furthermore, Erikson thought each of these basic beliefs developed out of a crisis (which could be resolved successfully or remain unresolved) at a critical period in our development. Thus, he characterized each of the eight **psychosocial stages** in his developmental theory as a choice between two opposing beliefs, such as *trust versus mistrust*, the first developmental problem of our lives (see Table 7.1).

Erikson theorized that, in the first 18 months of life, the major developmental task facing the infant is to develop a sense of **trust** in the world. As we have seen, infants who develop a secure attachment style see the world as an interesting place, full of new experiences to explore. With the security of a primary caregiver as a "safe base" from which to explore, these infants become prepared to develop into children (and later into adults) who are comfortable in new situations and possess an adventurous and resilient spirit to help them through life. Children with insecure attachment styles in this formative period may experience difficulties navigating through later developmental challenges, as the lack of trust acts as a barrier between the individual and the social world. To put it more simply, infants who do not develop a basic sense of trust in others will have trouble forming and maintaining satisfactory relationships. In this way, the unconscious assumption of trust fosters the choice to trust others, whereas a basic assumption of mistrust promotes suspicion.

While Erikson's theory has its critics, the criticism revolves primarily around whether his eight stages occur in their prescribed order for everyone or whether they can be experienced at different times for different people (based at least in part on cultural norms). Critics also note Erikson's work was based primarily on his own clinical observations rather than rigorous scientific methods. Remarkably, though, many of his observations have since been supported by methodologically sound research. And his was the first theory of human development to encompass the entire life span: Previous theories were interested only in the first 12 to 17 years of life, with the misguided notion that, once you got through adolescence, you were fully and permanently developed! For these reasons, Erikson's theory remains prominent today in the study of human development.

Psychology Matters

Not Just Fun and Games: The Role of Child's Play in Life Success

Now that we understand that both nature and nurture influence our outcomes in life, let's illustrate their interaction by examining a psychological trait of utmost importance to success in life: **self-control**. This ability to restrain our impulses and make effective choices often requires us to delay instant gratification in pursuit of longer-range success. A growing body of research finds low self-control to be a strong predictor of delinquency and criminal behavior, while higher self-control is linked to a variety of positive outcomes—including happier relationships, higher grades, better self-esteem, secure attachment, and less alcohol abuse (Tangney and others,

2004). Even when the effects of intelligence and social class—two other strong predictors of success—are accounted for, self-control remains one of the strongest predictors of these important life outcomes (Moffitt and others, 2011). Clearly, then, self-control is important—so how do we get it?

Nature—or our genetic inheritance—sets the stage for our baseline ability to manage our emotions and control our impulses. Evidence for this is found in twin studies that reveal, for example, identical twins are much more alike in impulsivity than fraternal twins (Vernon and others, 2008). Notably, however, the genetic contribution to this trait appears to account for only about 40% of it—leaving ample room for environmental contributions.

Given what we know about brain development and **plasticity**, it stands to reason that the sooner we nurture self-control, the better our chances of developing it. Parents can teach children to manage their impulses in a variety of simple ways, such as picking up their toys before going outside, finishing homework before getting television time, or eating all their vegetables in order to get dessert. Clear, consistent rules help children learn to manage their worlds and provide guidelines for achieving their goals. At school, teachers in some programs wear a double-sided cue card around their neck, showing a green side when children are behaving well, but flipping it over to the red side as a cue to a child acting irresponsibly. In this way, children get instant and palatable feedback, which helps them learn to manage their emotions and make positive choices—thus enabling environmental influences to stretch the "genetic leash" of impulse control.

Rules and structure, however, can go too far. A growing number of child psychologists are expressing concern at the way childhood play has evolved in past decades (Berk, 2002). Compared to kids in previous generations, today's child engages in much more supervised and structured playtime, such as league sports, leaving less time for imaginative, make-believe play. Why does that matter? Improvisational play requires more thinking, planning, creativity, and self-management on the child's part than does structured play—and these are precisely the skills that help develop a child's **executive function** or the frontal lobe areas in our brains linked to setting and achieving goals, and to self-regulation. Studies show that kids who engage in more imaginative play with their peers learn executive functions sooner, resulting in greater cooperation with peers, more participation and responsibility in assigned tasks, and better social skills (Elias & Berk, 2002).

What's more, imaginative play helps build vocabulary. Young children playing doctor, for example, use bigger words than they otherwise would, such as "injection" or "thermometer." Preschoolers playing "airport" were overheard telling another "passenger" that her bottle exceeded the 3-ounce liquid limit (Bartlett, 2011). Psychologist Laura Berk notes that for kids to regulate themselves and their games, they need to engage in "private speech," talking themselves through each phase in planning and carrying out the game. As a result, they gain not only language skills but also cognitive flexibility and self-control.

These kids, pretending to be having sushi together, are building their executive functions, as well as their vocabularies and communication skills.

The evolution of play styles has another effect, powerfully demonstrated in a replication study comparing 21st-century children to kids in the 1940s. Among other things, kids aged 3, 5, and 7 were asked to stand still for a period of time. Seventy years ago, 5-year-olds could stand still for about 3 minutes, and 7-year-olds could do so as long as they needed to. In the current study, however, 5-year-olds couldn't stand still at all, and 7-year-olds managed to follow instructions for about 3 minutes—equal to the 5-year-olds in the 1940s study (Spiegel, 2008).

While modern life certainly offers a variety of advantages to children, enhanced self-control does not appear to be one of them. And "nature" doesn't evolve so fast as to explain the changes. Thus, given what research tells us about the connection between self-regulation and life success in a broad array of areas, parents and teachers may do well to focus more efforts on creating environments that help kids develop this important ability.

Key Question: What Are the Developmental Tasks of Childhood?

Core Concept 7.2

Nature and nurture work together to help children master important developmental tasks, especially in the areas of language acquisition, cognitive development, and development of social relationships.

Three of the greatest accomplishments of your life include acquiring language, forming relationships with important people, and developing your ability to think and reason. Each of these serves as the basis for further development throughout our lives. And we will see that, as children work through these tasks, they undergo profound psychological changes resulting from both their genetic code and

their environment. As the core concept states the main idea of this section:

> Nature and nurture work together to help children master important developmental tasks, especially in the areas of language acquisition, cognitive development, and development of social relationships.

Developmental differences between children and adults are huge, but the differences in language, thought, and socialization are not simply the result of adults' greater experience or knowledge. The differences between children and adults also involve the unfolding of crucial processes in **maturation**. In other words, children's abilities are a result of not only their experiences but also their unique level of brain development. Let us first explore these processes at work in the development of language.

By the end of this section, you will be able to:

7.4   **Describe the process through which children develop language skills**

7.5   **Explain Piaget's theory on cognitive development**

7.6   **Discuss the factors that influence social and emotional development in childhood**

7.4: How Children Acquire Language

Objective: **Describe the process through which children develop language skills**

One of the defining characteristics of humans is the use of complex language—our ability to communicate through spoken and written words and gestures. From a developmental perspective, human language acquisition is awe inspiring: Newborn children know no words at all, yet in only a few years, virtually all become fluent speakers of any language they hear spoken regularly—or see, in the case of gestural languages such as American Sign Language. What makes them such adept language learners? Developmental specialists believe human infants possess innate abilities geared specifically for this task (Pinker, 1994, 2006).

7.4.1: Language Structures in the Brain

Do children learn language primarily by mimicking the sounds and/or signs they hear or see in their environment? According to one prominent theory, mimicry accounts for only part of their learning. An elegant biological foundation underlies the practice children get imitating others—a foundation that enables much more rapid development of language than mere imitation would allow. That foundation is an inborn mental structure that psycholinguist Noam Chomsky (1965, 1977) calls a **language acquisition device (LAD)**. Breaking new ground in our understanding of language development, Chomsky proposed that humans are born with a sort of mental software program that helps children acquire the vocabulary, grammar, and rules of the language to which they are exposed. Many experts agree (Hauser and others, 2002). Further, research based on the Human Genome Project provides evidence that the foundations of language are, in part, genetic (Liegeois and others, 2001).

In Chomsky's theory, the LAD, or "mental software program," contains some very basic rules common to all human languages. One such rule might be the distinction between nouns (for names of things) and verbs (for actions). These innate rules, Chomsky suggests, make it easier for children to discover patterns in languages to which they are exposed. Additional evidence for Chomsky's theory comes from the fact that children worldwide learn their native languages in very similar stages at very similar times. A logical hypothesis for explaining this pattern would be that children possess inborn "programs" for language development that automatically run at certain times in the child's life.

Despite the widespread agreement that humans possess an innate ability to acquire language, we cannot ignore the role of the environment. Although infants are born with the ability to produce all the sounds in the approximately 4,000 languages spoken on our planet, by about 6 months of age they seem to have zeroed in on the dominant language in their environment. The months spent hearing these sounds combine with their own experiments at verbalization to refine their efforts, and they lose the ability to produce sounds that are not part of their own language. Children being raised in a Japanese-speaking culture, for example, lose the ability to distinguish between the sounds made by the letters *R* and *L,* as the letter *L* is not part of the Japanese language (Iverson and others, 2003).

Such cultural variations in the specifics of children's language development suggest that the built-in capacity for language is not a rigid device, but rather a set of "listening rules" or guidelines for perceiving language (Bee, 1994; Slobin, 1985a, 1985b). Babies pay attention to the sounds and rhythms of the sound strings they hear others speak (or in sign language, see), especially the beginnings, endings, and stressed syllables. Relying on their built-in "listening guides," young children can quickly deduce the patterns and rules for producing their own speech. These observations underscore the notion that the LAD is flexible, enabling ready adaptation to the dominant language in the

young child's environment (Goldin-Meadow & Mylander, 1990; Meier, 1991).

7.4.2: Acquiring Vocabulary and Grammar

So, inborn abilities lay the foundation for learning language, but how do you think children learn the specific words and structure of their particular language?

In fact, they are practicing earlier than you probably realized. By 4 months of age, for example, babies are **babbling**: making repetitive syllables such as "mamamama." And babbling isn't just baby talk—it is the infant beginning to experiment with the building blocks of his or her language. Interestingly, deaf babies raised in a sign-language environment start babbling at just the same time—but with their hands, mimicking repetitive syllables from ASL (Petitto & Marentette, 1991). Babbling develops rapidly, and by about their first birthday, babies enter the one-word stage and are speaking full words. They are also learning new words quite rapidly; you might notice the "naming explosion," when children seem to delight in their efforts to point to objects and name them. By age 2, children enter the two-word stage, which tremendously increases the range of meanings they can convey. At that point, the average child has a vocabulary of nearly 1,000 different words (Huttenlocher and others, 1991). That number burgeons to an astounding 10,000 words by age 6 (Anglin, 1993, 1995). Over the next several years, the pace of vocabulary acquisition accelerates even more, as you can see in Figure 7.2, with the average child gaining about 50,000 new words in that short time span.

Figure 7.2 Growth in Grade School Children's Vocabulary

The number of words in a child's vocabulary increases rapidly during the grade school years—even faster than during the preschool years. This chart shows total vocabulary, including words that a child can use (production vocabulary) and words that a child can understand (comprehension vocabulary).
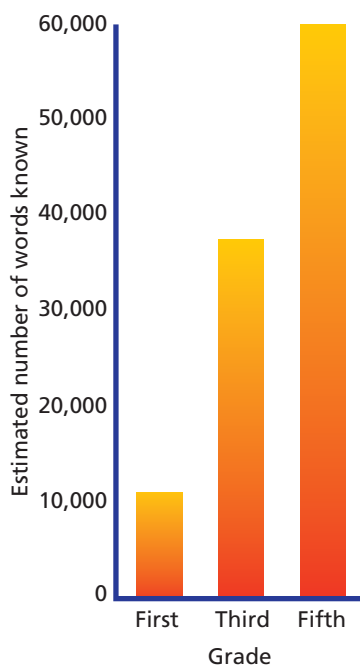
PRACTICE MAKES PERFECT Even though the rapid development of language seems driven largely by a genetic timetable, the role of culture and the environment can significantly impact the degree and the pace at which children learn language. Like many learning tasks, the frequency of practice makes a difference. Mothers generally talk more with their young daughters than with their young sons (Leaper and others, 1998). Even more pronounced is the difference between children raised in low- versus middle-SES households (the term *SES* refers to socioeconomic status, which is a composite indicator of income and education level). Parents in low-SES households read to their children an average of just 25 hours between the ages of 1 and 5—compared to a whopping 1,000 hours in the middle-SES group (Neuman, 2003). These differences in early learning—including not just reading, but having conversations with children—widen to a monumental gap by kindergarten: children from the poorest families can lag up to 2 years behind on standardized language tests by age 5, and their vocabularies are only half the size of children who receive more language stimulation (Hoff, 2013).

GRAMMAR TURNS VOCABULARY INTO LANGUAGE The same set of words, combined in a different sequence, can convey a variety of meanings. For example, "I saw him chasing a dog" and "I saw a dog chasing him" both use exactly the same words, but switching the order of the words *him* and *dog* yields completely different meanings. **Grammar** makes this possible: It is a language's set of rules about combining and ordering words to make understandable sentences (Naigles, 1990; Naigles & Kako, 1993). Different languages may use considerably different rules about grammatical combinations. In Japanese, for example, the verb always comes last, while English is much more lax about verb position. And if you speak Spanish, you know that while English speakers would say "the blue house," in Spanish the color name would come after the noun (*la casa azul*).

FIRST SENTENCES In their early two- and three-word sentences, children produce **telegraphic speech**. For example, "Want cookie" is telegraphic speech. To develop the ability to make full sentences, children must learn to use other forms of speech, such as modifiers (adjectives and adverbs) and articles (the, those), and they must learn how to put words together grammatically. In English, this means recognizing and producing the familiar subject-verb-object order, as in "The lamb followed Mary."

Finally, as children's language ability develops, they become skilled in using **morphemes**, the individual meaningful units that make up words. For example, the word "unmarried," has three morphemes: "un," "marry," and "ed." Similarly, "subcategories" has three: "sub," "category," and "es." Morphemes can mark verbs to show tense (walked, walking) and mark nouns to show possession (Maria's, the people's) and plurality (foxes, children). (Can you identify

the number of morphemes in each of those examples?) Often, however, children make mistakes because they do not know the rule or they apply an inappropriate one (Marcus, 1996). One common error, known as *overregularization,* applies a rule too widely and creates incorrect forms. For example, after learning to make past tense verb forms by adding *-d* or *-ed,* children may apply this "rule" even to its exceptions, the irregular verbs, creating such nonwords as *hitted* and *breaked.* Learning to add *-s* or *-es* to make plurals, children may apply the rule to irregular nouns, as in *foots* or *mouses.*

7.4.3: Other Language Skills

To communicate effectively, words and the grammatical rules for combining them are only the beginning: children also need to learn the *social rules of conversation.* They must learn how to join a discussion, how to take turns talking and listening, and how to make contributions that are relevant. Adult speakers use body language, intonation, and facial expressions to enhance their communication. They also respond to feedback they get from listeners and are often able to take the perspective of the listener. Children must master these skills to become successful communicators, which in turn enables them to become part of a human language community.

As they grow older, children also learn to express abstract meanings, especially as their thoughts extend beyond the physical world and into their psychological world. For example, after the age of 2, children begin to use words such as *dream, forget, pretend, believe, guess,* and *hope* as they talk about internal states (Shatz and others, 1983). They also use words such as *happy, sad,* and *angry* to refer to emotional states. Later, after further cognitive advances, they understand and use highly abstract words such as *truth, justice,* and *idea.*

What is the major point that stands out amid the complexities of language acquisition? It is part of our Core Concept: *Language is a major developmental task of childhood— for which children are exquisitely prepared.* And the way they acquire and use language suggests that these early steps on the path to adulthood rely on both innate timetables and stimulation from the environment.

7.5: Cognitive Development: Piaget's Theory

Objective: **Explain Piaget's theory on cognitive development**

If you have ever known a toddler going through the naming explosion, you have seen that children have an insatiable appetite for labeling things they know. Behind this labeling is their emerging ability for thinking, perceiving, and remembering. The next few pages will focus on how these mental abilities emerge: a process called **cognitive development**, which is the second of the three main developmental tasks of childhood identified in our Core Concept.

Psychologists interested in cognitive development ask such questions as:

- *When do children realize that objects still exist even when they can't see them?*
- *Do they know it is possible to hold ideas that aren't true?*
- *Can they understand that people have desires and dreams, but objects do not?*

Developmental psychologists investigate not only *what* children think but also *how* they think, as illustrated in the pioneering work of Swiss psychologist Jean Piaget. For nearly 50 years, Piaget observed children's intellectual development and formulated his observations into a comprehensive theory.

Piaget began this quest to understand the child's mind by carefully observing the behavior of his own three children. His methods were simple: He would pose problems to them, observe their responses, slightly alter the situations, and once again observe their responses. Piaget paid special attention to the developmental transitions and changes in his children's thinking, reasoning, and problem solving. This focus led to a **stage theory** of development, which emphasized Piaget's view that people undergo distinctive revolutions in their thought processes, producing four discrete *stages* that emerge as they move through childhood and adolescence. We will see subsequently that three key ideas distinguish Piaget's approach:

1. Schemas
2. Interaction of Assimilation and Accommodation
3. Stages of Cognitive Development

7.5.1: Schemas

To illustrate the concept of **schemas**, think of some four-legged animals. Now think of some that are friendly. Then think of one that barks. You might have started by imagining elephants, tigers, cats, and dogs (all four-legged), then narrowed your choices down to cats and dogs (four-legged and friendly), and finally to just dogs (which bark). You could do this easily because you have developed mental structures that enable you to interpret concepts and events. Piaget termed such mental structures schemas. We have schemas for concepts, such as "dog" and "development." We have schemas for actions, such as "eating with chopsticks," or "studying." We also have

schemas for solving problems, such as "finding the area of a circle" or "dealing with a crying baby." In general, schemas are mental frameworks that guide thinking. According to Piaget, they are also the building blocks of development. Schemas form and change as we develop and organize our knowledge to deal with new experiences and predict future events. As you read this, you are building a schema about schemas!

ASSIMILATION AND ACCOMMODATION   In Piaget's system, two dynamic processes underlie all cognitive growth: assimilation and accommodation. **Assimilation** is a mental process that incorporates new information, situations, or examples into existing schemas. So a baby who knows how to grasp a rattle will apply the same strategy to grab onto a sparkly piece of jewelry worn by his caregiver. Likewise, an older child whose family has a pet canary might use assimilation during a trip to the zoo when she learns that a large parrot or flamingo is also a bird. You, too, experience assimilation when you read about a favorite actor's new film or learn to use an updated version of a particular program on your computer. Essentially, when we assimilate, we are broadening an existing schema by integrating new information into it.

An infant finds that the sucking reflex works just as well with a bottle as with a breast and, thus, assimilates when she adds sucking a bottle to her existing schema for sucking.

By contrast, we use **accommodation** when new information does not fit neatly into an existing schema. Accommodation is the process of restructuring or modifying schemas to accommodate the new information. Thus, a child who has learned to grasp rattles and jewelry may have trouble trying to grasp a large ball the same way. Similarly, if the child on her first trip to the zoo encounters a bat, she will have to create a new schema for "bat," since it is a creature with wings but is not a bird. Adults experience accommodation of their mental schemas, too. For example,

Figure 7.3 Assimilation and Accommodation—What's the Difference?

Illustration of Two Schemas

Illustration of Assimilation

Illustration of Assimilation

Assimilation or Accommodation?
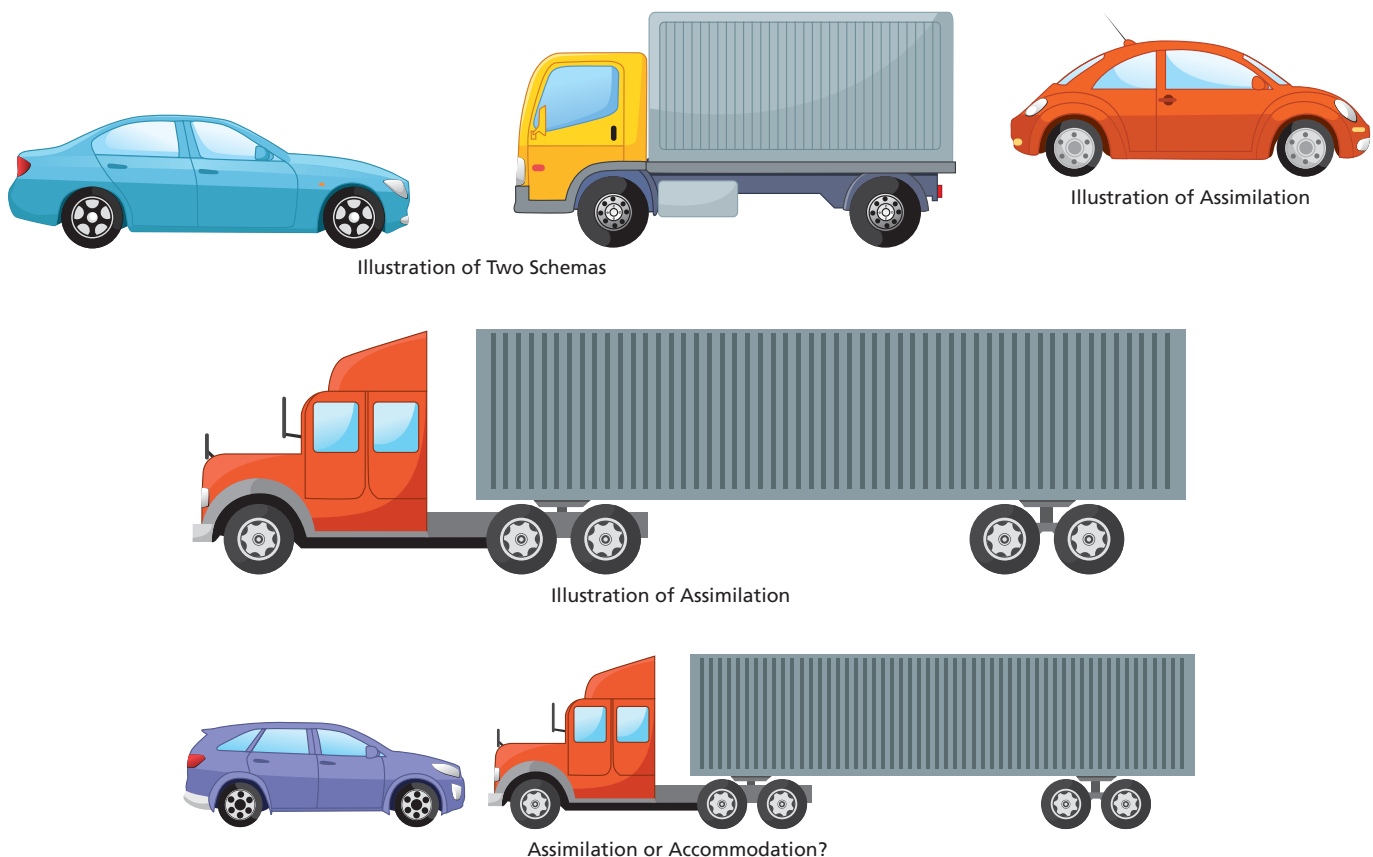
the Internet has caused widespread accommodation in the schemas people use to conceptualize shopping and communicating. As a student, you may sometimes need to modify your schema for studying when strategies that used to work for you no longer result in the grades you desire.

Accommodation can also help you adapt to different customs and cultures. For example, communication rules vary among different cultures, even in the United States. If your schema for communicating includes a polite pause after one speaker finishes and another begins, you might not be able to get a word in edgewise if you find yourself in a group whose schema embraces interrupting and "talking over" each other. Thus, you would have to accommodate (alter your original schema for communication) to fit in. In our increasingly multicultural world, accommodation can be a very effective strategy in adapting to new environments.

For Piaget, cognitive development results from the continual interweaving of assimilation and accommodation. Through these two processes, the individual's behavior and knowledge become less dependent on concrete external reality and increasingly reliant on internal thought. In general, if new information fits into an existing schema, you are assimilating, but when you must alter your schema or create a new one for new information, you are using accommodation.

WRITING PROMPT

Assimilation and Accommodation in Your Life

Think of a new experience you recently had—it might be starting at a new school, a new job, going to see some kind of event that was new to you, or anything else that had some unfamiliar element. Going into that new experience, what knowledge did you have from previous experiences that you were able to transfer to this new situation in order to more quickly adapt to it (assimilation)? Did you end up having to create a new schema for this new situation (accommodation)? If so, tell how.

▶
> The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

7.5.2: Piaget's Stages of Cognitive Development

Now that we understand schemas and how they are constantly shaped by new information, let's examine the four revolutionary changes Piaget observed in children's perception of the world as they develop. He described these changes as stages of cognitive growth:

1. The Sensorimotor Stage (Infancy)
2. The Preoperational Stage (Early Childhood)
3. The Concrete Operational Stage (Middle Childhood)
4. The Formal Operational Stage (Adolescence)

At each stage, distinct thinking styles emerge as the child progresses from sensory reaction to logical thought. It is important to note that the **maturation** process dictates that all children progress through the four stages in the same sequence. Because of the interaction of heredity and environment, though—the **genetic leash**—some children pass more quickly through a given stage than others. A child in an education-rich environment, for example, will master the cognitive tasks of each stage more rapidly than one with limited educational opportunities.

THE SENSORIMOTOR STAGE (BIRTH TO ABOUT AGE 2)
We have seen that children enter the world equipped with many innate sensory abilities and reflexive behaviors, such as recognizing familiar sounds and the grasping and sucking reflexes. According to Piaget, children in the **sensorimotor stage** explore the world primarily through these senses and motor actions. For example, they learn to coordinate the information they are receiving from their senses with their motor abilities, such as learning to swivel their head to see something behind them, and then to crawl or walk toward it if they desire the object. Piaget called this **sensorimotor intelligence**.

During this rapidly evolving stage of development, babies work toward the major achievement of this stage: **object permanence**, which begins at about 8 months. Before that time, you might have noticed, babies will not look for a toy or other object that disappears. Piaget interpreted this behavior to mean they did not understand that the object still existed when they could no longer see it. In other words, it was "out of sight, out of mind." Beginning around 8 months, though, if you show an infant a toy and then let her see you hide it under, say, a blanket, she will look for it under the blanket. What's more, she will reliably do this even with a delay of a minute or more between the hiding and the seeking. This demonstrates the beginning of the understanding of object permanence. Over the next several months, infants develop the ability to seek something after increasingly longer delays and also become more successful at finding objects hidden in different locations than they were the first time (Moore & Meltzoff, 2004).

Object permanence, then, helps us understand **separation anxiety**. As anyone who has cared for an infant has surely noticed, infants typically become quite upset when you leave—which makes perfect sense in the early stages of object permanence. After all, they don't yet understand you will come back at some point. Instead, when you leave the room, you cease to exist. Imagine

how frightening that would be for an infant! (You saw separation anxiety in action in the attachment video you saw in the previous section, when the babies became upset when their mothers left the room.) Once object permanence is completely mastered, marking the end of the sensorimotor stage, a child understands that someone or something still exists, even when they can't see it. As a result, most children grow out of separation anxiety by about age 2.

Concurrently with these accomplishments, infants are learning **goal-directed behavior**, as evidenced by their experiments with various objects. For example, a child who drops a spoon might be very interested in the clatter it makes as it bounces off a tile floor and want to repeat the action over and over again. What may seem annoying to an onlooker with sensitive hearing is really just the infant delighting in exercising some control over his world!

The emergence of object permanence, combined with an infant's increasing experiments with goal-directed behavior, provide substantial evidence that infants are beginning to form **mental representations** of objects and to recognize their own relation to the world. This mental imagery empowers a child's thinking and problem solving. Imitative behaviors that, early in infancy, were confined to the immediate present situation will show up after increasing delays in time, in what is the beginning of *observational learning*. By 6 months, infants will imitate behaviors they saw the previous day, and during the second year, they can retain and imitate images of previously seen behaviors for as long as a month (Klein & Meltzoff, 1999). These achievements of the sensorimotor stage propel the toddler into the next stage: the preoperational stage.

THE PREOPERATIONAL STAGE (FROM ABOUT 2 TO 7 YEARS OF AGE) The cognitive advances in the next developmental stage, the **preoperational stage**, grow out of the ability to represent objects mentally. After noting rapid development during the sensorimotor stage, Piaget seems to have seen the preoperational stage as a sort of transition stage between the sensorimotor stage and the third stage (the concrete operational stage). In his observations, this was a period in which symbolic abilities that emerged in the sensorimotor stage expanded and consolidated. As such, he described the primary features of this stage as limitations in a child's thinking, rather than advances. Let's consider some of those features.

- **Egocentrism** causes children to see the world only in terms of themselves and their own position. Further, they assume that others see the world in the same way they do. (We hasten to add that Piaget did not intend egocentrism to be interpreted as selfishness, but rather as a limited perspective on the world.) Piaget discovered this through an experiment he called the "three mountains task."

WATCH Piaget's Three Mountains Task

Watch for yourself as children attempt this task, and see how preoperational children view the world differently than their older peers. View the video at: https://www.youtube.com/watch?v=v4oYOjVDgo0

- So, when you are talking to a preoperational child on the phone, she may simply nod in response to a question you ask (without saying anything), not realizing you can't see her nodding. Another charming example of egocentrism is the child who covers his eyes and then thinks no one can see him! As a result of this egocentrism, Piaget thought preoperational children were not yet able to fully empathize with others or take others' points of view. This is one aspect of Piaget's theory that has been challenged, a point we will elaborate on shortly.

- **Animistic thinking** involves the belief that inanimate objects have life and mental processes, just as people do. This is when we see children having a tea party with their teddy bears, putting a Band-Aid on a doll that has fallen and hit the ground, or worrying that trimming a tree might hurt it.

- **Centration** occurs when a child focuses his attention too narrowly, missing out on other important information; that is, the child can "center" on only one bit of information at a time. As a result, the child will not understand the "big picture" of an event or problem. So, for example, a thirsty child may insist on drinking a "big glass" of juice, preferring a tall narrow container to a short wide one that in truth holds an equal amount. In the preoperational child's mind, the height of the glass is mistakenly assumed to hold more juice, and the bigger width of the other glass is not noticed. One of the gateways from the preoperational stage into the next stage—the concrete operations stage—is moving past centration to an ability called **conservation** (see Figure 7.4).

- **Irreversibility** is the inability to think through a series of events or steps involved in solving a problem and then to reverse course, returning to the mental starting point. In short, preoperational children lack the mental trial-and-error ability of older children to do and then undo an act in their minds. For example, Sam might see Maria spill a box of raisins on the table and—because the raisins are spread out over a large area—think, "Wow! Maria has lots more raisins than I have

Figure 7.4 Centration and Conservation

Preoperational thinkers can focus on only one feature of something at a time—in this case, either tall or short. They cannot simultaneously notice the differences in width, and thus cannot understand that the amount of liquid remains the same when poured into a different-sized container.

"Do they have the same amount of water or a different amount?"

"Now watch what I do" (pouring).

"Do they have the same amount of water or a different amount?"

in my little box." But preoperational Sam cannot mentally reverse the process and think, "If she put them all back in the box, it would look like the same amount I have in mine." This inability represents the biggest obstacle to logical thinking in the preoperational child.

While Piaget saw these as limitations, it is important to recognize what abilities are growing during this time. Children are experimenting with their newly acquired ability to use mental representations, and in the process they are often highly creative. We see this creativity in the animism they display and in other make-believe games that are a central feature of the preoperational stage. In fact, it can be argued that, when creativity in problem solving declines in the next stage, the "advancement" is not just a gain but in some ways also a loss.

THE CONCRETE OPERATIONAL STAGE (FROM ABOUT 7 TO ABOUT 11 YEARS OF AGE) In the next stage, children break through the barrier of irreversibility to understand, for the first time, that many things stay essentially the same even when their superficial appearance changes. In this **concrete operational stage**, they can understand that a short, wide glass can hold as much juice as a tall, narrow one or that the spilled raisins that came out of the box must fit back into the box. In mastering **conservation**, the problems that defeated the preoperational child now yield to a new understanding of the way volume is conserved. Similarly, they now understand that a string of red beads is no longer than an identical string of blue beads, even though the red beads are stretched out in a line while the blue beads lie in a small pile. They realize the beads look different in their grouping, but this does not mean they are different in number.

Along with the ability to understand conservation, children at this stage have another wondrous new ability. They now can solve problems by manipulating concepts entirely in their minds, performing something psychologists call **mental operations**. This allows concrete opera-

WATCH Conservation Tasks in Action

of an object does not necessarily change other properties
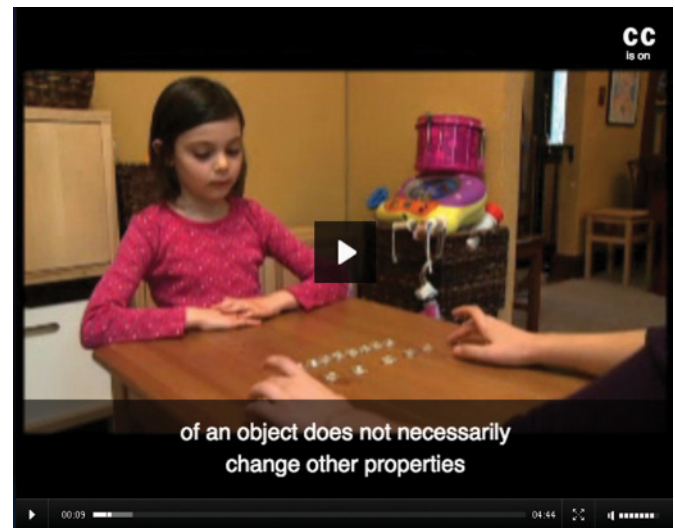
See how young children, limited by centration, cannot understand conservation, but once in the concrete operational stage, their new ability to perform mental operations leads the way to a better understanding of this important principle..

tional children to think things through before taking action. As a result, they may be less impulsive. They are also less gullible, giving up many "magical" notions, such as the belief in Santa Claus or the Tooth Fairy, which they now believe to be impossible.

Thus, concrete operational children begin to use simple reasoning to solve problems. The symbols they use in reasoning are, however, still mainly symbols for concrete objects and events, not abstractions. The limitations of their concrete thinking reveal themselves in the familiar game of "20 Questions," the goal of which is to determine the identity of an object by asking the fewest possible yes/no questions of the person who thinks up the object. A child in this stage usually makes a series of specific guesses about what the object is ("Is it a bird?" "Is it a cat?"), rather than asking higher-level questions that use categories to more efficiently

narrow down possibilities for the correct answer ("Does it fly?" "Does it have fur?").

We will save our discussion of Piaget's final stage of cognitive development—the formal operational stage—for our discussion of adolescence. For now, suffice it to say that the final stage involves the development of abstract thought. Table 7.2 summarizes Piaget's four stages.

Table 7.2 Piaget's Stages of Cognitive Development

Stage (Ages)	Characteristics and Major Accomplishments
Sensorimotor (approximately 0–2 years)	Children explore the world through their senses and motor abilities. **Object permanence** and **goal-directed behavior** emerge, along with the beginning of symbolic thought.
Preoperational (approximately 2–7 years)	Children's thought is characterized by **egocentrism**, **animistic thinking**, **centration**, and **irreversibility**. Symbolic thought continues to develop.
Concrete operations (approximately 7–11 years)	Children have mastered **conservation** and develop the ability to perform **mental operations** with images of concrete, tangible objects.
Formal operations (approximately 12+ years)	Teens and adults in this stage develop ability for abstract reasoning and hypothetical thought.

7.5.3: Beyond Piaget: Contemporary Perspectives on Cognitive Development

Most psychologists accept the broad picture Piaget painted of development (Beilin, 1992; Lourenço & Machado, 1996). However, researchers have shown that children are, in some ways, more intellectually sophisticated at each stage than Piaget believed (Munakata and others, 1997).

HINTS OF ABILITIES APPEAR EARLIER THAN PIAGET THOUGHT The limitations Piaget observed in the sensorimotor and preoperational stages can sometimes be mastered by children still in these age ranges. **Object permanence** is one example: The beginning of **mental representation** occurs as early as 4 months of age rather than in the second year, as Piaget thought. Children at that age shown "possible" and "impossible" events do not show

surprise when viewing the possible event, but do show surprise upon seeing the "impossible" event (Baillargeon & DeVos, 1991; see Figure 7.5).

Researchers have also found, in contrast with Piaget's notion of **centration**, that by age 3 or 4, children understand that the unseen insides of objects (such as the inside of an egg, a rubber ball, or a dog) are not necessarily identical to their external appearances (Gelman & Wellman, 1991). And contrary to Piaget's claims about **animistic thinking**, 3- to 5-year-old children, when pressed to do so, are consistently able to distinguish between real and purely mental (imaginary) entities (Wellman & Estes, 1986). Finally, regarding **egocentrism**, by age 4 children can often see others' perspectives, as illustrated by the fact that they use simpler language and shorter words when talking with 2-year-olds than they do with older children or adults (Gelman & Shatz, 1978). Overall, Piaget's observations regarding the sequence of stages are accurate, but children today seem to develop some cognitive skills at a more accelerated pace than Piaget observed.

A THEORY OF MIND These cognitive advances signal development of a **theory of mind**, which is an understanding that others may have beliefs, desires, and emotions different from your own, and that these mental states influence their behavior (Frith & Frith, 1999). Your theory of mind underlies your expectations about how people will act in certain situations—such as when given a gift or when spoken to angrily. Importantly, it includes recognition that our expectations about others' actions may have to be adjusted based on what we know about that particular individual. This understanding of others' mental worlds facilitates empathy for others, enables deception, and increases our chance of making sound judgments about people when it counts.

Recent evidence indicates these abilities may begin as early as 6 months of age—which dovetails with recent findings on object permanence discussed in the previous section. At that age, one study discovered that infants could reliably distinguish between a helpful character and a harmful character and unfailingly chose the helpful character as a playmate (Hamlin and others, 2007). The cognitive milestones of the sensorimotor and preoperational stages facilitate further development of this initial accomplishment; and, by 5 years of age, children cross-culturally seem to

Figure 7.5 Testing Infants for Object Permanence

Test Events

Possible event (a) Possible event (b) Impossible event (c)
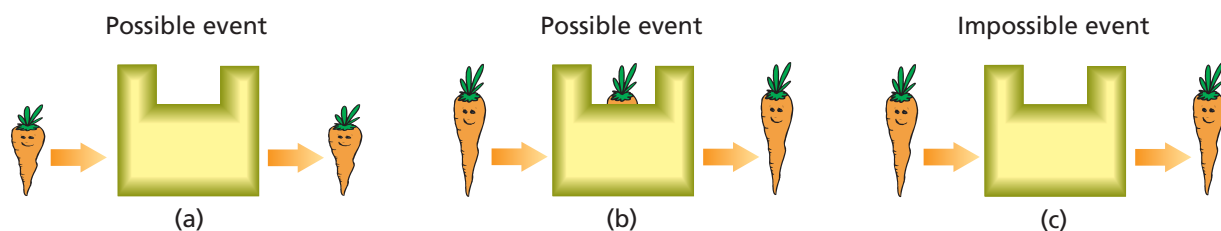
understand that others' perceptions of the world may differ from their own (Callaghan and others, 2005). To see some charming demonstrations of children exhibiting a theory of mind, watch this engaging video entitled "A Change of Mind" and see if you can spot the illustration of theory of mind, along with some examples of Piaget's pre-operational thinking. Then, respond to the journal question that follows.

WRITING PROMPT

Recognizing a Theory of Mind in Action

Did you spot the test that demonstrated theory of mind? In addition, identify at least one illustration of Piaget's pre-operational thinking that was demonstrated in the video. Explain what you saw the kids in the video do that illustrated the concepts you noted.

▶ ```
   The response entered here will appear in the
   performance dashboard and can be viewed by
   your instructor.
   ```

   Submit

---

**STAGES OR WAVES?**  A second criticism of Piaget's theory questions his notion of the stages as abrupt transitions. Newer research suggests the transitions between one stage and another are more continuous than Piaget's theory implies. Psychologist Robert Siegler suggests a new metaphor for development (Siegler, 1994). Instead of the abrupt changes implied by stage theories, he proposes we think of "waves." The **wave metaphor**, he says, better fits both the scientific data and our everyday experience, which shows the variability of children's behavior. For example, during a single day, a child may use several different strategies to solve the same linguistic problem: "I ate," "I eated," and "I ated." This is not the pattern we would find if a child were making a sudden leap from one stage to another. Instead, says Siegler, this is a pattern of overlapping developmental waves, where each wave can be thought of as the ebb and flow in the strength of a cognitive strategy (Azar, 1995).

**THE IMPORTANCE OF CULTURE IN LEARNING**  Russian psychologist Lev Vygotsky (1934/1987) emphasized the importance of cultural values and practices in a child's cognitive development, including the role of communication in learning. For Vygotsky, cognitive development was really the mental mastery of the rules and norms of a culture, transmitted via social interaction. Vygotsky's work, supported by others in more recent years (Conner & Cross, 2003; Rogoff, 2003), demonstrates how adults and other "experts" can help children develop their cognitive abilities more rapidly using a process called **scaffolding**. Just as a wood and steel scaffold provides support for the construction of buildings, cognitive scaffolding creates a support structure for constructing knowledge. By paying close attention to a child's current skill level, parents or teachers

can tailor their instruction to that child by attaching each new lesson to something the child already knows. Vygotsky further identified the need for new challenges to be a bit beyond the child's current learning, but reachable with a little help, and not so far out of reach as to set the child up to fail. This **zone of proximal development** provides an important guideline for the parent or teacher in creating a learning plan for the child.

# 7.6:  Social and Emotional Development

**Objective:**  **Discuss the factors that influence social and emotional development in childhood**

Our health, happiness, and even our survival depend on forming meaningful, effective relationships in the family, with peers—and, later in life, on the job. As children, we begin the long process of learning the rules our society follows for social and political interactions. Children must also learn to monitor their own feelings and behavior and to understand those of others. This process of social and emotional development is one of the most important developmental tasks of childhood, and it relies on both nature and nurture.

## 7.6.1:  Temperament

One powerful influence on the way children interact with the world is their **temperament**. Psychologists use the term *temperament* for an individual's inherited, "wired-in" pattern of personality and behavior. Harvard researcher Jerome Kagan, who has studied temperament in thousands of children, observed that about 20% of children are born with tendencies toward shyness, while about 40% are born predisposed to boldness (Kagan, 1998). Shy babies, in the face of unfamiliar situations, become upset or withdrawn and are likely to try to avoid the situation. Bold babies, on the other hand, are more sociable and likely to react with interest to new situations.

Brain-imaging studies indicate these differences are physiological: Shy babies have more active **amygdalas** than do bold babies (Schwartz and others, 2003). These active amygdalas set in motion a series of physiological responses to stress, such as higher heart rate, release of stress hormones, and greater skin temperature changes in response to new situations. Thus, the shy children are physiologically wired to be more sensitive to change and stress than their bold, sensation-seeking counterparts. This sensitivity may promote an advantage in interpersonal relations, however. Child development researcher Grazyna Kochanska (2009) suggests that fearfulness in children plays an important role in the child's moral development, fostering awareness of the

consequences for wrongdoing—including empathy for the victim. Children who exhibit normal fearfulness are more likely to feel guilty after committing an offense, and that guilt helps serve as a deterrent later to repeated wrongdoing.

While basic temperaments can be recognized almost at birth, they are not written in stone (Kagan, 1996). From very early on, the environment interacts with these genetic tendencies, so that parenting styles and other aspects of a child's experience can modify the way temperament expresses itself. Oftentimes, people are less likely to engage and be playful with a shy baby, which will accentuate the child's initial disposition. On the other hand, if a shy baby's parents recognize the child's withdrawal and gently play with her and encourage her to interact, the child will become more outgoing than her temperament would otherwise have predicted. And a bold child reared by bold parents will certainly experience and respond to the world differently than will a bold child reared by timid or fearful parents. Thus, children are capable of learning a variety of responses to the world within their hereditary temperamental range— as long as people in their environment teach them.

Temperament is remarkably stable over time; that is, your temperament at birth is generally similar to your temperament throughout childhood, adolescence, and adulthood. While environmental influences can modify a temperament somewhat, the **genetic leash** limits the extent of change. Thus, it is important to note that no temperament is ideal for all situations. We should "remember that in a complex society like ours, each temperamental type can find its adaptive niche" (Kagan, quoted in Gallagher, 1994, p. 47). Much of our individual life success is linked to our ability to find an environment that capitalizes on our strengths.

## 7.6.2: Socialization

Through interaction with your parents, peers, and others, you learned how to get along with people, a developmental task called **socialization**. Socialization, however, doesn't just happen in childhood. It is the lifelong process of shaping an individual's behavior patterns, values, standards, skills, attitudes, and motives to conform to those considered desirable in a particular society (Hetherington & Parke, 1975). Institutions such as family, schools, and the media exert pressure on the child to adopt socially approved values. Socialization of gender roles is one example: Boys and girls are often taught different ways of behaving and interacting. Leisuretime choices, such as television and peers, have heavy influences as well. An increasing number of preschool children are shaped also by their experiences in day care. And one other influence is of supreme importance: parenting styles.

**FOUR PARENTING STYLES AND THEIR EFFECTS** Most approaches to child rearing fall into one of four distinct parenting styles found in families all over the world (Baumrind, 1967, 1971; Russell and others, 2002). (As you

read about these, you might try to imagine how you may have turned out differently if your parents had used one of the other approaches.)

1. **Authoritarian parents** often live by the slogan, "Spare the rod and spoil the child." They demand conformity and obedience and tolerate little discussion of rules, which they enforce with punishment or threats of punishment.

2. In an alternative approach, **authoritative parents** can be demanding, too. They have high expectations of their children, which they enforce with consequences. But unlike authoritarian parents, they combine high standards with warmth and respect for the child's views: They are quite willing to listen to a child's ideas and feelings and often encourage a democratic family atmosphere. Authoritative parents usually place a heavy emphasis on reasoning and explaining to help children learn to anticipate the consequences of their behavior.

3. Taking a third approach, **permissive parents** set few rules and allow children to make their own decisions. Like authoritative parents, they are caring and communicative, but permissive parents give most decision-making responsibility to their children. Permissive parents believe children can learn better from the consequences of their own actions than they can from following rules set by their parents.

4. Finally, **uninvolved parents** tend to be either indifferent or rejecting, sometimes to the point of neglect or abuse (Maccoby & Martin, 1983). Typically, parents in this group lead such stress-filled lives that they have little time or energy for their children.

Overall, research on parenting styles has synthesized the differences in parenting behavior into two basic categories: parental warmth, which includes nurturing, emotional involvement, and sensitivity to the child's perspective; and parental control, which refers to how much of the decision-making the parent and child each engage in. Based on those two categories, can you figure out what combination of warmth and control we would expect to find in each of the four different parenting styles? Take a look at Table 7.3 to check your answer.

You can probably guess the usual outcomes of these different parenting styles. Research shows children with authoritative parents tend to be confident, self-reliant, and enthusiastic. Overall, these children are happier, less troublesome, and more successful. Those with permissive or unin-

**Table 7.3** Four Parenting Styles and Their Dimensions

| | High Control | Low Control |
|---|---|---|
| High Warmth | Authoritative | Permissive |
| Low Warmth | Authoritarian | Uninvolved |

volved parents are typically less mature, more impulsive, more dependent, and more demanding. Children with authoritarian parents tend to be anxious and insecure. In fact, in some cases, authoritarian parenting may be a risk factor for antisocial behavior. A groundbreaking study examined the combined effects of parenting style and **attachment style** on children's outcomes. The findings? For insecurely attached children, authoritarian parenting increased their risk of later antisocial behavior. Securely attached children, on the other hand, were able to tolerate authoritarian parenting without become oppositional. Researchers suggest that secure attachment may serve a protective role, leading the child to interpret the parent's harsher parenting behaviors as benevolent rather than threatening—as an insecurely attached child might (Kochanska and others, 2009).

In light of what we know about **attachment**, these findings shouldn't be surprising. Generally speaking, authoritative parents take a more involved, interactive role in their children's lives—forming a stronger social–emotional attachment—than do the other three types of parents. This lays a strong foundation for prosocial behavior in the developing child.

**CULTURE AND PARENTING STYLES**   Much of the early research on parenting styles was conducted in middle-class Western cultures. Can we expect the same findings elsewhere? What do you think?

Recent studies reveal that culture does play a role in parenting styles and parenting effectiveness, but not in the way you might think. Chinese, Hispanic, and Asian Pacific Island parents all tend to engage in stricter parenting than many Western parents and, from a distance, may resemble the authoritarian parenting style. A closer look, however, reveals that these same parents typically combine their strict rules and demands for respect with a great deal of warmth—especially from fathers. When this combination is present, children exhibit the same positive outcomes seen in Western children with authoritative parents (Berk, 2007). And in the United States, low-SES African American families exert high degrees of control over their children with positive results: These children do better in school and with peers than their counterparts who do not receive strict parenting (Taylor and others, 1995). Thus, optimal parenting style depends—at least to some degree—on the prevailing culture and the rules, norms, and challenges of that environment.

**EFFECTS OF DAY CARE**   As working parents increasingly rely on day care for their children, many people are asking the following question: How necessary is it to have a full-time caregiver? The question is an urgent one in many countries, including the United States, where 71% of moms work outside the home (Cohn and others, 2014), and more children are cared for by paid providers than by relatives (U.S. Department of Health and Human Services, 2009).

In general, working parents can breathe a sigh of relief: Most children thrive in day care. Both intellectually and socially, they do as well as—and sometimes better than—

children raised at home by a full-time parent. What's more, adult children who grew up with a working mom benefit in their own careers and relationships. In a study that included more than 50,000 people in 25 countries, daughters of working moms were better educated and earned more than daughters of nonworking moms. Sons benefitted, too, although in a different way: Data showed they spend more time caring for their own children and contributing to household chores than sons raised by stay-at-home moms—a finding which may contribute to higher relationship satisfaction (Miller, 2015).

Quality of day care does matter, though. Poor-quality day care experiences can influence children to be aggressive, depressed, or otherwise maladjusted. How can you distinguish good-quality from poor-quality when looking for day care? Experts point to three key factors.

1. In high-quality day care, caregivers interact frequently with children and are responsive and sensitive to their needs.
2. High-quality day care also has a low ratio of caregivers to children, so that each caregiver has plenty of time and energy for each child.
3. And, finally, caregivers are better educated in higher-quality day care.

Fortunately, ongoing nationwide studies of child care indicate that many day care centers do a fine job (Bower, 1996; NICHD Early Child Care Research Network, 2003, 2007).

**LEISURE INFLUENCES**   Children and adolescents in the United States and other industrialized countries have much more free time than do children elsewhere in the world. In nonindustrialized societies, children average some 6 hours a day working at some sort of chores or labor. By comparison, the typical American child spends less than 30 minutes at such tasks. On the other hand, American children spend more time (on the average) doing schoolwork than did children in years past—although not as much as their foreign counterparts in other industrialized countries. Overall, though, the amount of free time available to U.S. children has increased dramatically over the last several generations (Larson, 2001). On average, American children today spend between 40% and 50% of their waking hours in discretionary activity.

What do children and teens do with all this leisure time? The majority of it is spent with media, including watching television, playing video games, and spending time on computers or other electronic devices (Rideout and others, 2010). Reading for pleasure is moderately popular; it is more so for girls than boys, though, and declines for both sexes as children grow into adolescence (Nippold and others, 2005). Time spent playing decreases as children age, becoming replaced largely by media-oriented activities, which are often engaged in with friends as well.

On average, children and teens spend 8 hours/day with media. That's twice as much as they spend with friends and family, and 6 times more than they spend in physical activity, reading, or doing homework.

What impact do these leisure-time activities have on a child's development? Research findings are mixed. Time with friends is associated with well-being at all ages (Rawlins, 1992) and may be especially important in adolescence. Playing sports, which kids and teens do for just over an hour a day on average, has obvious benefits for health, as well as—depending on the sport and the environment—leadership, cooperation, and motivation. The effects of television, a topic of close scrutiny over the past few decades, seem to depend primarily on the type of programming being viewed. Educational television, which accounts for about 25% of children's television viewing, has a positive impact on literacy and cognitive development (Linebarger and others, 2004). Heavy viewing of entertainment television, on the other hand, is a strong predictor of later deficiency in reading ability for young children (Ennemoser & Schneider, 2007). And the hundreds of studies examining the impact of viewing violent television leave no doubt that it increases aggressive behavior in viewers (Strasburger, 1995). Moreover, viewing any kind of entertainment television prior to the age of 3 is powerfully linked to attention problems later in childhood (Zimmerman & Christakis, 2007). We will examine the mechanics of this association in the *Psychology Matters* feature on ADHD at the end of this section.

Playing video games with violent content affects aggression in a manner similar to that of watching violent television. In addition, research shows that violent video games decrease players' sensitivity to real-world violence (Carnagey and others, 2007) and also decrease prosocial (helping) behavior (Anderson & Bushman, 2001). On the other hand, frequent video gaming appears to improve visual–spatial processing (Green & Bavelier, 2007). And not all video games are violent. Educational video games can improve critical thinking and learning in a variety of subjects ranging from social studies to math. Once again, the message seems clear: The content matters more than the medium itself.

**GENDER DIFFERENCES IN SOCIALIZATION**  Anyone watching young boys and girls playing will notice gender differences in their social interaction. The sexes usually prefer to segregate themselves—a pattern that holds across cultures (Maccoby, 1998, 2000). In their play, boys are typically more aggressive than girls, although there are certainly exceptions. Girls tend to organize themselves into small, cooperative groups. By contrast, boys often form larger groups with a hierarchical structure or "pecking order." In these groups, individual boys continually compete for higher-ranking positions. They frequently resort to aggressive tactics, such as hitting, shoving, and verbal threats. Gender differences are noticeable in choices of leisure activities as well. Boys are more likely to play sports or computer games in their leisure time than girls are, whereas girls watch more television (Cherney & London, 2006).

Evolutionary psychologists believe these gender differences have an innate basis (Buss, 1999), which may be related, in part, to gender differences in testosterone levels (Dabbs, 2000). This does not mean, of course, that environmental factors, such as parenting styles and peer influences, make no difference. Social-cognitive theorists like Kay Bussey and Albert Bandura (1999) remind us that children also learn gender roles and gender-related behaviors, such as aggressiveness, competitiveness, or cooperation, from their social environments and role models.

## 7.6.3:  Psychosocial Development in Childhood: Erikson's Stages

Erik Erikson's theory of life span development characterizes eight fundamental challenges, or **psychosocial stages**. that we encounter as we progress through life. The first stage, *trust vs. mistrust,* occurs between 0 and 1½ years and coincides with children's development of **attachment**. In childhood, individuals progress through three more of Erikson's stages, each time encountering a new "crossroad" and developing another key component in their schemas about themselves and their relation to the world. What do these stages reveal about what the social world looks like through a child's eyes?

**AUTONOMY VERSUS SHAME OR SELF-DOUBT**  In the second stage, which runs from about 18 months to 3 years of age, toddlers are rapidly learning to walk and talk. This increasing level of interaction with the world is laden with opportunities to directly influence outcomes. To develop a sense of independence or **autonomy**—the main developmental task in this stage—children need freedom (and sometimes encouragement) to try to do things on their own when appropriate. Too much restriction or criticism can lead to self-doubt, whereas harsh demands made too early, such as attempting toilet training before the child is ready, can lead to shame and discourage efforts to persevere in master-

ing new tasks; hence the name for this stage, *autonomy versus shame or self-doubt.* Parents can nurture the development of autonomy by encouraging children's efforts, offering gentle and supportive guidance, and praising their efforts and successes. Children who enter this stage with a general sense of **trust** in the world are more likely to successfully develop autonomy than children who did not master the first stage.

Although Erikson didn't address the role of **temperament** in psychosocial development, we should point out its influence: We would expect shy children to need more gentle encouragement than bold children. Thus, although a nurturing and supportive environment is key to development of autonomy, nature plays a role as well.



In this stage, a child optimally develops a sense of personal control over his world. Potty training is a key milestone, enabling a child to become autonomous or independent. Harsh criticism or unrealistic expectations at this time can create shame or self-doubt in the child, instead of autonomy.

**INITIATIVE VERSUS GUILT**   Once a child develops trust and autonomy, the third challenge is to cultivate **initiative**, or the ability to initiate activities oneself, rather than merely responding to others. During the preschool years, children who have developed autonomy will now become more purposeful, wanting to choose what to wear, what to eat, or how to spend their time. The danger at this stage comes from overcontrolling adults, who may demand an impossible degree of self-control ("Why can't you sit still?"), which can result in the child feeling overcome by inadequacy and guilt. The term for this stage reflects these two alternatives: *initiative versus guilt*. Caregivers' responses to self-initiated activities either encourage or discourage the freedom and self-confidence needed for the next stage.



Children expand their autonomy and now begin to experiment with taking the initiative and making their own choices in activities and relationships. Limiting or criticizing a child's growth at this stage can lead to guilt. Instead, encourage curiosity and creativity to nurture initiative.

**INDUSTRY VERSUS INFERIORITY**   Children who successfully master Erikson's first three stages enter elementary school ready to develop their skills and competencies in a more systematic way. From ages 6 to 12, school activities and sports offer arenas for learning more complex intellectual and motor skills, while peer interaction offers the chance to develop social skills. Successful efforts in these pursuits lead to feelings of competence, which Erikson called **industry**. Nurturing and supportive parenting at this stage helps children reflect on their experiences, learning from both their successes and failures and also recognizing that some failures are inevitable. On the other hand, children with overly demanding or disengaged parents may have trouble seeing their failures in perspective and ultimately develop a sense of inferiority. Likewise, youngsters who had trouble with one or more of the earlier stages may become discouraged spectators rather than performers, leading also to feelings of inferiority rather than competence. The term for this stage, therefore, is *industry versus inferiority.*

In summary, we have seen how development of language, cognitive skills, and social competencies interacts during the rapid growth and changes of childhood. Individual gains in each of these areas progress on a general biological timetable, but the pace and nature of the gains are heavily influenced by our environment.

**WRITING PROMPT**

**Reflecting on Development During Childhood**

As we have seen, childhood is a busy time of development in many areas. Reflect on all that you have learned about this important stage of life in this section, and answer the question: What new information really stands out in your mind, and why?

▶   The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

# The Puzzle of ADHD

**Attention-deficit hyperactivity disorder (ADHD)** is a psychological disorder found in 5% to 7% of school-age children in America, with cross-cultural prevalence similar at about 5% (Polanczyk and others, 2007, 2014; Willcutt, 2012). Symptoms of ADHD cluster into two main categories: Hyperactivity and impulsiveness are the primary physical distinctions, and disorganization and inattention characterize the cognitive symptoms (Figure 7.7). Thus, people with ADHD may commonly exhibit poor impulse control, difficulty concentrating on a task for a sustained period of time, high distractibility, and excessive activity. Although ADHD affects both boys and girls, the symptoms tend to be more noticeable in boys, who may frequently jump out of their seats in class, blurt out answers, or interrupt a conversation. In girls, however, symptoms of ADHD more often show up as inattention, rather than physical hyperactivity. Thus, girls with ADHD may just seem disorganized or forgetful. This difference in symptoms may also affect diagnosis: Girls account for only about 20% of ADHD diagnoses, although some researchers suspect part of the difference lies in the ways the symptoms present themselves (Skogli and others, 2013).

In both boys and girls, these difficulties bleed over into multiple domains, often resulting in poor academic performance and unstable peer relationships. In fact, the impact of symptoms on multiple domains in life is one requirement for diagnosis of ADHD, and necessary to distinguish true ADHD from commonly occurring symptoms of stressful lives or features of normal childhood development. Symptoms must also significantly exceed what is age-appropriate for children at various ages. The disorder seems to follow a predictable developmental path, with symptoms appearing in the early childhood years and, in roughly 50% of cases, spontaneously fading away as the child enters adolescence. Of kids and teens diagnosed with ADHD, however, 30% continue to struggle with symptoms of the disorder into adulthood (Lara and others, 2012). What's more, over half of adults with ADHD—many of whom do not get proper treatment—have one or more additional psychological disorders, and these individuals are also at increased risk for drug and alcohol abuse, as well as suicide (Barbaresi and others, 2013). Clearly, proper diagnosis and treatment are key to effective management of the disorder.

## What Causes ADHD?

Research to determine the causes of ADHD is in the early stages, although twin studies and other **heritability** research point to a strong genetic component (Barkley, 2014). Physiologically, how does an ADHD brain differ from a "normal" brain? One important difference has to do with the neurotransmitter dopamine, active when a person is engaged in an interesting task (Spencer and others, 2013). People with ADHD seem to receive fewer and/or weaker dopamine bursts, which correlates with less engagement and long-term interest in a task. Structural development of the brain seems to play a role as well: Although earlier research indicated that ADHD brains were smaller than non-ADHD brains, newer research reveals that the difference is often simply a matter of timing. Most ADHD brains do develop normally and achieve normal size—they simply take a few years longer to do so. One key finding is that development of the **prefrontal cortex** can be delayed by up to 5 years (Shaw and others, 2012) in ADHD brains—which fits with ADHD patients' difficulties with **executive functions**, such as staying focused on a multistep task requiring planning and follow-through. Interestingly, the motor cortex actually develops faster than normal in ADHD brains, which

**Figure 7.6** Symptoms and Criteria for ADHD

The DSM-5 provides industry-approved guidelines to psychologists and psychiatrists to effectively and accurate diagnose psychological disorders. Here, you can see the criteria for diagnosis of ADHD.

**DSM-5 Criteria for ADHD**

**≥5** symptoms per category **in adults**, ≥6 months; age of onset ≤12 years; noticeable in ≥2 settings; impact on social, academic or occupational functioning; not better accounted for by another mental disorder

**Inattention**
(a) Lack of attention to details / careless mistakes
(b) Difficulty sustaining attention
(c) Does not seem to listen
(d) Does not follow through on instructions (easily side-tracked)
(e) Difficulty organising tasks and activities
(f) Avoids sustained mental effort
(g) Loses and misplaces objects
(h) Easily distracted
(i) Forgetful in daily activities

**Hyperactivity/Impulsivity**
(a) Fidgetiness (hand or feet) / squirms in seat
(b) Leaves seat frequently
(c) Running about / feeling restless
(d) Excessively loud or noisy
(e) Always "on the go"
(f) Talks excessively
(g) Blurts out answers
(h) Difficulty waiting his or her turn
(i) Tends to act without thinking

researchers suggest might explain the hyperactivity feature of ADHD (Shaw and others, 2007). Overall, the finding that ADHD brains develop normally, albeit more slowly, may explain why some children with ADHD seem to "grow out of it" sometime in adolescence.

From a nurture perspective, prenatal exposure to nicotine and alcohol increase incidence of ADHD. And although some theories of environmental causes—such as a diet too high in sugar—have been debunked, recent research has revealed some provocative findings associated with other aspects of a child's environment. As we know, the first few years of life are a time when the brain is developing synaptic connections at a furious pace. We also know that the brain wires itself to adapt to its experiences. Could fast-paced media viewing "train" a young brain to prefer rapid change in stimulation? It certainly could, according to a recent review of 45 studies examining this possibility (Nikkelen and others, 2014). One longitudinal study found that children who viewed more non-educational television prior to the age of 3 were at greater risk for attention deficits later in childhood (Zimmerman & Christakis, 2007). Researchers suggest it is indeed the fast-paced movement of entertainment programming driving the finding: In other words, watching programs that quickly and frequently switch from one scene to another—during a time when brain connections are forming—limits the brain's opportunities to create pathways for more extended focus and concentration. Instead, it trains the brain to seek rapid changes in stimulation. It's easy to see how this sets a child up for problems with attention span later in life. This also explains why viewing similar amounts of educational television (which moves more slowly) did not increase incidence of attention deficits later in childhood. The study controlled for other factors that may influence development of attention deficits, such as family environment, parenting style, and cognitive stimulation. According to a companion study, 90% of children under 24 months regularly watch television, and half of what they view is entertainment television (Zimmerman and others, 2007).

## How Can ADHD Be Treated?

Both medication and psychological treatments can be effective in treating ADHD, but optimal treatment varies considerably among individuals. Many do well on medication, but careful monitoring and management by a physician with expertise in ADHD is highly recommended to match each patient with the right medication and dosage for that individual. Also, findings suggest periodic "trial withdrawals" to determine whether a child still needs medication (Swanson and others, 2007a)—of course, trial withdrawals must be conducted with the close supervision of the prescribing physician.

Alternatively, behavioral therapy helps children with ADHD learn to control some of their problematic behaviors and replace them with more effective behaviors—for example, learning to recognize an impulse and count to 10 before acting on it. Parents and other family members are crucial partners in effective behavioral therapy. Parents can set clear expectations and use principles of **operant conditioning** to help shape the child's behavior, one step at a time. All members of the family can help provide redirection when the child loses focus and reinforcement for each success. As with any type of behavior

modification program, though, consistency is important, which means the family must prioritize the time and attention necessary for treatment to be effective—which can be a challenge when a family is already juggling multiple tasks and priorities.

Behavioral therapy is the treatment of choice for very young children (for whom medication is not recommended). Also, it may be the best initial treatment for someone who has recently developed symptoms of ADHD; then, if it does not improve symptoms, medication may be added to the treatment plan. In many cases, a combination of medication and behavior treatment works best (Shaw and others, 2012).



Behavioral treatment for ADHD includes setting clear expectations and rules to establish structure. This parent is helping his daughter with a list of chores to help her stay organized and on task. It is also important to encourage regular physical activity and ensure proper sleep and nutrition.

## The Positive Side of ADHD

Like with most behavior patterns that deviate from what we perceive to be "normal," research and discussion on ADHD tends to assume ADHD is a problem that must be corrected. Recently, however, an alternative viewpoint has emerged in some circles, suggesting a more balanced perspective on the disorder:

[We must] remember that ADHD children possess many positive traits. They tend to be free-spirited, inquisitive, energetic and funny, as well as intelligent and creative. Their behavior is often spontaneous, helpful and sensitive. Many ADHD children are talented multitaskers, last-minute specialists and improvisationalists. Parents and educators should encourage these strengths and let their children know whenever possible that these qualities are highly valued (Rothenberger & Banaschewski, 2007).

Indeed, it has been suggested that Albert Einstein, Leonardo da Vinci, Bill Clinton, and Walt Disney all exhibited symptoms of ADHD. Entrepreneurs may also have higher rates of ADHD than found in the general population (Nicolaou and others, 2011). JetBlue founder Richard Neeleman appreciates the advantages that come with his ADHD: "If someone told me you could be normal or you could continue to have your ADD (the original name for what is now called ADHD), I would take ADD," Neeleman told *ADDitude Magazine*. "I can distill complicated facts and come up with simple solutions. I can look out on an industry with all kinds of problems and say, 'How can I do this better?' My ADD brain naturally searches for better ways of doing things."

Psychiatrist Dale Archer (2014, 2015) even suggests that ADHD is a kind of superpower that, properly harnessed, can propel individuals to greatness. It's worth noting, he asserts, "that some of the trait's most common characteristics—creativity, multi-tasking, risk-taking, high energy and even resilience—are, in fact, strengths when leveraged in the right way and in the right career." So, rather than trying to suppress ADHD symptoms, perhaps channeling them into productive directions, capitalizing on them, and turning them into positives offers a solution that is not only less frustrating, but more energizing and empowering. It's something to think about.

# Key Question: What Changes Mark the Transition of Adolescence?

## Core Concept 7.3

**Adolescence offers new developmental challenges growing out of physical changes, cognitive changes, and socioemotional pressures.**

Were all your developmental tasks finished by the time you entered **adolescence** (or, in plain English, were you "all grown up")? Most early theorists thought so. After that, they assumed, the psyche was set for life and would undergo few important changes. Modern research disputes these older views. Today's psychologists agree that we have a remarkable capacity for developmental change throughout our life span (Kagan, 1996, 1998). Again, in adolescence, the big changes lie in three important areas—as our core concept for this section says:

Adolescence offers new developmental challenges growing out of physical changes, cognitive changes, and socioemotional pressures.

When does adolescence begin? Or, to put the question more personally, what event first made you think of yourself as an adolescent? Chances are it had something to do with your sexual maturation, such as a first menstrual period or a nocturnal ejaculation. Psychologists mark the beginning of adolescence at the onset of puberty, when sexual maturity (the ability to reproduce) is attained. Besides sexual maturity, what else happens during adolescence? And when does adolescence end and adulthood begin?

By the end of this section, you will be able to:

**7.7** Explain how way social and psychological dimensions of adolescence depend heavily on cultural context

**7.8** Examine the issues of body image and sexual identity that emerge during adolescence

**7.9** Describe the neural and cognitive developmental changes that occur in adolescence

**7.10** Evaluate theories of moral development and moral disengagement

**7.11** Describe some of the issues faced by adolescents

# 7.7: Adolescence and Culture

**Objective:** Explain how social and psychological dimensions of adolescence depend heavily on cultural context

Variations among cultures compound the difficulty of specifying the span of adolescence. Although the physical changes that take place at this stage are universal, the social and psychological dimensions of adolescence depend heavily on cultural context. For example, if you enter your teen years in a society that celebrates puberty as the entry to adulthood and rewards you with power to make responsible choices, your experience will be very different than someone whose culture dismisses teenagers as confused and potentially dangerous troublemakers.

Can you imagine becoming an "adult" around age 13? In most nonindustrial societies, that is the norm: There is not an adolescent stage as we know it. Instead, children in these societies move directly into adulthood with *rites of passage*. These rituals usually take place about the time of puberty and serve as public acknowledgment of the transition from childhood to adulthood. Rites of passage vary widely among cultures, from extremely painful rituals to periods of instruction on sexual and cultural practices or periods of seclusion involving survival ordeals. For example, in some tribal groups, a young person takes a meditative journey alone or submits to symbolic scarring or circumcision surrounded by friends and family. Once individuals have completed the passage, there is no ambiguity about their status: They are adults, and ties to their childhood have been severed.

Our own culture has some transition rituals, but the meanings are less well defined, and as a result, they do not provide clear markers for the beginning of adolescent or adult status. Qualifying for a driver's license is one such rite of passage for many middle-class teens in America. Another, which you might recall, is high school graduation. Mexican American girls may celebrate *quinceañeras,* and Jewish American teens may celebrate bat mitzvahs or bar mitzvahs. All of these provide a young person with an added measure of freedom and independence not available to children, but none are necessarily aligned with the transition into or out of adolescence.

Although many issues loom large in adolescence, we will focus on the most important developmental tasks

confronting adolescents in the United States and the industrialized Western world. The central task of this period is establishing one's identity. That complex process relies on coming to terms with physical maturity, achieving a new level of cognitive development, redefining social roles and emotional issues, dealing with sexual opportunities and pressures, and the development of moral standards. We begin with the physical changes marking the end of childhood and the onset of adolescence.

# 7.8: Physical Maturation in Adolescence

**Objective:** Examine the issues of body image and sexual identity that emerge during adolescence

One of the first signs of approaching adolescence is the pubescent growth spurt. **Puberty**, or sexual maturity, for boys begins with increasing size of the testicles, while for girls typically begins with the development of breasts. Sprouting of pubic hair generally follows for both sexes, along with growth of external genitalia. This process generally commences around age 10 or 11 for girls, and about 2 years later for boys. Puberty peaks with the production of live sperm in boys (usually at about age 14 in the United States), and **menarche**, or the onset of menstruation, in girls (usually between ages 11 and 14; Slyper, 2006).

## 7.8.1: Body Image

Do you recall becoming more aware of your appearance during adolescence? Dramatic physical changes and heightened emphasis on peer acceptance—especially acceptance by sexually attractive peers—intensify concern with one's **body image**. Boys and girls alike often judge themselves harshly by the standards they think other people may be applying to them. And, unfair as it may be, physical attractiveness does influence the way people think about each other (Benzeval and others, 2013; Hatfield & Rapson, 1993). Thus, one of the most formidable tasks of adolescence is coming to terms with one's physical self by developing a realistic—yet accepting—body image. And the timing of puberty impacts the way teens' body images develop: boys who mature earlier than their peers generally have a positive body image, whereas early-maturing girls often have a negative body image. These girls also report more bullying from peers (Downing & Bellis, 2009).

Physical appearance is one of the biggest concerns among adolescents (Perkins & Lerner, 1995). Girls' self-concepts lean heavily on their perceptions of their physical attractiveness, while boys are more concerned with their physical prowess and athletic ability, as well as their effectiveness in achieving goals (Lerner and others, 1976; Wade, 1991). And these gender differences in attitudes impact teens' behaviors—often to



Body image—for boys and girls alike—becomes especially important in the teenage years.

disturbing extremes. One study found that a staggering 80% of 10-year-old girls had dieted at least once (Hepworth, 2010), which in turn increases their risk of eating disorders (Newmark-Sztainer and others, 2006). Boys feel the pressures of idealized body images, too, although they worry more about not being big and muscular enough, leading many to engage in obsessive body-building and, sometimes, steroid use. On average, about 1 in 5 adolescent boys report being very concerned about their body image and taking action to improve it (Field and others, 2014).

Cultural norms and messages play a leading role in the relationship between body image and self-acceptance, with media presentation of "ideal" women and men taking center stage. These cultural messages, however, have become increasingly unrealistic: In 1975, the average fashion model weighed 8% less than the average woman. Today, she weighs 23% less—and fully one-fourth of today's models meet the weight criteria for anorexia. In the same time period, the action figures boys use as guidelines for ideal bodies have increased greatly in muscle while shrinking to almost zero body fat. That body image can only be realistic for perhaps 1% to 2% of the male population, according to Dr. Raymond Lemberg, an expert on male body image (Santa Cruz, 2014). Many experts believe that the rising rates of anxiety and depression in teens are at least partly a result of the increasing disconnect between media images and reality (Grabe and others, 2007).

Yet, for teens in Hong Kong, while body fat is related to physical self-concept, it doesn't decrease self-esteem. In fact, being too thin is perceived in a similar manner as being too fat, probably reflecting the Chinese cultural value for moderation, as well as greater acceptance of obesity than

This image shows a scientific analysis of the unrealistic dimensions of the traditional Barbie doll. Note that her waist size would only hold half a liver, and her feet and ankles would be incapable of holding her weight.



The Lammily doll, created by Nickolay Lamm, aims to offer children a realistic body-image alternative to traditional Barbie dolls. Lammily is purportedly modeled after the measurements of the average 19-year-old girl, and comes with glasses, and stickers for scars, stretch marks, and freckles.

American culture (Marsh and others, 2007). But the spread of Western ideals is expanding the reach of powerful media images and their impact on teens' body images: Young women in both the Middle East and Japan are developing body-image problems at increasing rates (Chisuwa & O'Day, 2010; Thomas and others, 2010).

Fortunately, increasing attention to this growing concern is prompting some attempts at presenting more realistic role models in the media, as illustrated by the Dove Campaign for Real Beauty showing a more body-diverse group of women in their underwear, and film stars such as Jennifer Lawrence speaking out on the importance of health over weight. And a new "real-size" Barbie doll (instead called the Lammily doll, named after its creator), with measurements based on the average body of a 19-year-old female, can be accessorized with stickers for acne, stretch marks, and grass stains. Lammily's creator hopes to soon have a real-sized boy doll available soon.

## 7.8.2: Adolescent Sexuality

Physical maturity also comes with a new awareness of sexual feelings and impulses. Not surprisingly, perhaps, a majority of American adolescent males and females report thinking about sex often (Offer and others, 1981). By age 17, about 40% of teens in the United States and Canada have had their first sexual experience, a figure that rises to about 75% by age 20 (Berk, 2007; Harvey & Spigner, 1995). Males and females, though, differ in reports of their first sexual experiences. For the vast majority of females, emotional involvement is an important ingredient of sexual attraction. In contrast, for most males, personal relationships appear to be less important than the sex act itself. In fact, the average male reports little emotional involvement with his first sexual partner (Miller & Simon, 1980; Sprecher and others, 1995).

Masturbation is the most common orgasmic expression of sexual impulses in adolescence (Wilson & Medora, 1990). Common among both sexes, teen boys are more likely to self-stimulate than teen girls. Two-thirds of 14-year-old boys report having masturbated at least once, whereas slightly less than half of girls at that age have done so. Those figures rise steadily over the next few years of adolescence (Robbins and others, 2010). But these figures are only estimates and could well be low. You can imagine the problems scientists face in trying to get good data on private sexual practices. Sex research typically involves surveys, which—even when anonymous, as most are— may not give a complete picture of behaviors traditionally associated with shame and guilt.

**Sexual orientation** also begins to emerge in adolescence, with the majority of adolescents having a predominantly heterosexual orientation. The same cautions that apply to the data on masturbation also apply to the research on the prevalence of gay, lesbian, and bisexual orientations, so it is difficult to know how accurate the data are. Studies generally find that 8% to 12% of teens report having had sexual contact with a same-sex partner. Same-sex behavior, however, does not necessarily mean the individual considers him- or herself to be gay, lesbian, or bisexual. Some

experiment with same-sex activity, yet think of themselves as heterosexual—in fact, two-thirds of sexually active teens who have had exclusively same-sex partners report a heterosexual orientation (Mustanski and others, 2014). This discrepancy highlights one of the difficulties of defining sexual orientation: Is sexual orientation based on one's behaviors, or self-perception and cognitive identity (in other words, how you *think* about yourself), or on feelings of attraction—or on all of those factors? Overall, teen girls are more than twice as likely as boys to identify as a sexual minority (gay, lesbian, or bisexual), which researchers think is at least partly explained by girls' tendency to consider such factors as romantic attraction and social acceptability in defining their sexual orientation (Diamond, 2012).

Sexual attraction toward the same sex or both sexes is difficult to resolve during adolescence, when individuals are intensely concerned with the conventions and norms of their society. While most gay and lesbian individuals first become aware of their sexual orientation in early adolescence, many may not attain self-acceptance of their sexual identities until their 20s or beyond (Hunter, 2012). The time lag undoubtedly reflects the relative lack of social support for nontraditional sexual orientations, and it exemplifies the importance of society's role in all aspects of identity development. With the 2015 Supreme Court ruling mandating acceptance of gay marriage in all 50 states, however, the tide may be turning—and not a moment too soon: Health researchers find that same-sex activity in adolescence increases risk of suicide, likely due to lack of acceptance (Jiang and others, 2010).

# 7.9:  Neural and Cognitive Development in Adolescence

**Objective:**  **Describe the neural and cognitive developmental changes that occur in adolescence**

Changes that began in the womb continue to occur in the adolescent brain (Johnson and others, 2009). While early childhood is the most rapid period for development of neural connections, the frontal lobes of the brain continue to mature throughout adolescence and into young adulthood. What are the implications of this adolescent change in neurology?

## 7.9.1:  Teens: Guided by Reason or Emotion?

The **frontal lobes** are critical for rational thinking and judgment (among other things). The **orbito-frontal cortex** plays a particularly important role: helping us weigh the emotional component of a choice with a more rational evaluation of our long-term goals. It puts the brakes, so to speak, on the basic impulses driven by our **amygdala**. In adolescence, the amygdala is fully developed, but the frontal lobes (including the orbito-frontal cortex) are not. This imbalance in the pace of brain development means the teen brain is wired to react more emotionally than an adult (for whom both areas are developed) or a child (for whom neither area is developed). Teens' amygdalas send out impulses their frontal cortices can't effectively process (McClure and others, 2004). Add to that the pubescent increases in estrogen and testosterone levels (Spear, 2000), and it's no wonder adolescents are prone to sensation-seeking and risk-taking behaviors.



The adolescent brain—in human and other mammals—seems wired for risk-taking. Parts of the brain necessary for rational thinking are not yet fully developed, so the emotional amygdala drives many impulsive actions.

**Is this unique brain pattern of adolescence necessarily bad, though? What do you think?**

As previously noted, adolescence is a time when individuals establish their identity, with the ultimate goal of becoming independent from the family unit. Perhaps the increased risk taking is a necessary component that helps teens explore and experiment in their environments. In other words, it may provide a biological basis for the courage necessary to go out on one's own. Further, the heightened emotional reactivity may aid in threat perception, helping the teen become quickly aware of dangers associated with new activities and thus promoting success and survival. The same brain patterns have, in fact, been observed in nonhuman species such as primates and rodents, suggesting that the neural development of adolescence may indeed serve an important evolutionary purpose (Casey and others, 2008).

## 7.9.2:  The Brain Undergoes Major Pruning

Throughout childhood and adolescence, the brain is actively pruning unused neural connections. Closely tied

to synaptic pruning is the concept of **sensitive periods** for development of certain abilities (Kurth and others, 2010). The two concepts together underscore the importance of a rich environment in the early years of life, so neural pathways can form to support a wide variety of skills and abilities. In early adolescence, regions of the brain that haven't been adequately stimulated continue to be trimmed away in the process of **synaptic pruning**. As this occurs, the adolescent brain gradually becomes less adept at learning completely new things as opportunities for neural connections begin to diminish. On the plus side, this allows for enhanced development of stronger regions: Continued use of established connections builds the **myelin** of the neurons, which in turn enables faster functioning. On the minus side, though, **plasticity** is reduced and problematic behavior patterns or traits that have developed become more resistant to change or intervention. And if the pruning process goes awry, important connections may be lost, which could help explain the onset in late adolescence and early adulthood of disorders such as schizophrenia (Moskowitz, 2009).

By adolescence, then, behavior patterns developed in earlier years have strengthened considerably. Adolescence may represent the last fertile opportunity to intervene in the development of strong traits, be they athletic, artistic, linguistic, or **psychopathic**. For example, studies of various treatment programs for individuals with psychopathic traits such as callous and unfeeling behavior show the highest rate of success among 4- to 6-year-olds, with moderate success among teen offenders and no measurable success among adults (Caldwell and others, 2007; Dadds & Fraser, 2006). Also, a twin study found that maintaining a high GPA could act as a buffer against development of antisocial behavior in the teen years, decreasing the impact of other genetic and environmental risk factors (Johnson and others, 2009).

### 7.9.3: Piaget's Final Stage: Formal Operational Thought

Adolescence brings with the final stage of Piaget's **theory** of cognitive growth, involving the ability for abstract and complex thought. In this **formal operational stage**, the individual begins to ponder introspective problems, such as how to become better accepted by peers. Teens also become capable of dealing with abstract and intangible issues, such as fairness, love, and reasons for existence. Essentially, they learn to deal with hypothetical problems rather than needing the concrete base of the previous stage. With these formal operational reasoning powers, adolescents and adults can now approach life's problems using more systematic thinking strategies. In a game of "20 Questions", for example, they will impose their own structures on the task, starting with broad categories and

then formulating and testing hypotheses in light of their knowledge of categories and relationships. In contrast to the random guessing exhibited in earlier stages, their questioning moves from general categories ("Is it an animal?") to subcategories ("Does it fly?") and then to specific guesses ("Is it a bird?"; Bruner and others, 1966).

Current research, however, questions Piaget's notion that formal operational thought necessarily develops in adolescence. Some adults, it seems, never develop this capacity; instead, it appears dependent on education and experience. College-educated people are more likely to demonstrate formal operational thought, and in general, people are most skillful with abstractions and hypotheticals in their areas of expertise (Keating, 2004). Overall, development of this type of cognitive ability, more than any of Piaget's other cognitive tasks, appears highly reliant on cultural values and the environment.

# 7.10:  Moral Development

**Objective:**  **Evaluate theories of moral development and moral disengagement**

- *Is there a pattern in the development of our sense of right and wrong?*
- *Do some people achieve higher levels of morality than others?*
- *And why do we sometimes engage in actions that hurt others, even though we consider ourselves to be good people?*

These issues of moral development, which begin early in life (and, some would argue, also have some **innate** origins), crystallize in adolescence. Let's examine what psychological research can tell us about what factors are involved in our morality.

### 7.10.1:  Kohlberg's Theory of Moral Development

The best-known psychological approach to moral development comes from the late Lawrence Kohlberg (1964, 1981), who based his theory on Piaget's view of cognitive development. After all, reasoned Kohlberg, moral thinking is just a special form of cognition. Mirroring Piaget's stages and other stage theories of development, each stage in Kohlberg's theory of moral reasoning is based on a different moral standard.

What interested Kohlberg most were not the decisions people made in moral challenges, but rather the thought processes they went through in the decision-making process (Alper, 1985; Kohlberg, 1968). Accordingly, Kohlberg probed people's moral thinking by presenting people with a series of *moral dilemmas,* such as the one in Figure 7.8.

### Figure 7.8 Kohlberg's Test of Moral Reasoning

In Europe a woman was near death from a very special kind of cancer. There was one drug that the doctors thought might save her. It was a form of radium that a druggist in the same town had recently discovered. The drug was expensive to make, but the druggist was charging ten times what the drug cost him to make. He paid $200 for the radium and charged $2000 for a small dose of the drug. The sick woman's husband, Heinz, went to everyone he knew to borrow the money, but he could only get together about $1000, which is half of what it cost. He told the druggist that his wife was dying and asked him to sell it cheaper or let him pay later. But the druggist said, "No, I discovered the drug, and I'm going to make money from it." So Heinz got desperate and broke into the man's store to steal the drug for his wife. Should Heinz have done that? Why or why not (Colby et al., 1983, p. 77)?

It made no difference to Kohlberg whether a person said Heinz should or should not have stolen the drug. The problem is a genuine dilemma, so a well-reasoned case can be made on either side. For Kohlberg and his colleagues, the interesting part of an individual's answer was the moral thinking behind it. They found that the reasons given fell into six categories, corresponding to the following stages. See if you can tell where your own response to the Heinz problem fits:

**Stage 1:** People reasoning at this seek primarily to avoid punishment. They show no concern for others. In response to the Heinz dilemma, they might say, "He should take the drug because he might get in trouble if he let his wife die." Or, on the other hand, "He shouldn't steal the drug because he might get caught and go to jail."

**Stage 2:** The first sign of awareness of other perspectives shows itself at the second stage of moral reasoning. Still concerned about reward and punishment, the Stage 2 person seeks personal gain, and might appeal to another person's self-interest to achieve it, saying, in effect: "You scratch my back, and I'll scratch yours." Here is a sample Stage 2 response to the Heinz case: "He should steal the drug because he is poor and needs his wife to help him make a living."

**Stage 3:** The main concerns at this stage are seeking social approval and keeping everyone happy. Decisions are based on personal relationships, rather than on principle. A typical Stage 3 response: "They won't blame him for stealing the drug, but everyone would think he is bad if he let his wife die." The goal, at this stage, is to be seen as good person.

**Stage 4:** Maintaining social order is paramount at Stage 4. In this stage, people often emphasize laws, rules, policies, promises, duty, or respect for authority in their responses. Someone at Stage 4 might say, "He shouldn't steal the drug because it would violate the Ten Commandments," or "He should steal the drug because his first obligation is to his wife."

**Stage 5:** Kohlberg called this the "social contract" stage because it emphasized the idea that rules and laws are flexible and can be changed by social consensus and by legislation. Emphasis at this stage is on fairness rather than on the blind obedience of the previous stage. A possible Stage 5 response to the Heinz dilemma: "He should take the drug, and the law should be interpreted to allow an exception under such desperate circumstances."

**Stage 6:** At this stage, the individual bases a decision on universal principles of conscience that he or she would apply to all people in all situations. These are abstract and general principles, which often refer to the dignity and worth of each person rather than concrete rules and laws. A possible Stage 6 response: "He should take the drug because, if he doesn't, he is putting a greater value on property than on human life."

You can see how Kohlberg's **stages of moral reasoning** parallel the stages of Piaget's theory, as the individual moves from concrete, egocentric thinking to more other-oriented, abstract thinking about right and wrong, and social consciousness. Accordingly, in the first stages, a child may not steal a cookie for fear of punishment, while at a more advanced level, the child may resist stealing for fear of not living up to the parents' expectations. In general, the earliest stages of moral reasoning are based on self-interest, while later, more advanced stages center on others' expectations or on broader standards of social good. Not all people, however, attain the later, least egocentric stages. In fact, Kohlberg found that many adults never even reach Stage 4. Table 7.4 summarizes these stages.

**Table 7.4** Kohlberg's Stages of Moral Reasoning

| Levels and Stages | Reasons for Moral Behavior |
| --- | --- |
| **I. Preconventional morality** | |
| Stage 1: Egocentric pleasure/pain/profit | Avoid pain or avoid getting caught orientation |
| Stage 2: Cost/benefit orientation; reciprocity | Achieve/receive rewards or mutual benefits ("I'll scratch your back if you'll scratch mine") |
| **II. Conventional morality** | |
| Stage 3: "Good child" orientation | Gain acceptance, avoid disapproval |
| Stage 4: Law-and-order orientation | Follow rules, avoid penalties |
| **III. Postconventional (principled) morality** | |
| Stage 5: Social contract orientation | Promote the welfare of one's society |
| Stage 6: Ethical principle orientation (e.g., Gandhi, Jesus, Mohammed) | Achieve justice, be consistent with one's principles, avoid self-condemnation |

**CRITIQUES OF KOHLBERG'S THEORY** Does moral development follow the same developmental sequence everywhere? Yes, said Kohlberg. Cross-cultural work shows that individuals attain the same stages in the same order in all cultures studied, including Turkey, Taiwan, Guatemala, Japan, and the United States (Eckensberger, 1994). However, this research also hints at some limitations of the theory to explain moral development in other cultural contexts: The higher stages, as defined by Kohlberg, have not been found in all cultures. Even in his native United States, Kohlberg found that Stages 5 and 6 do not always emerge. Their emergence appears to be associated with high levels of verbal ability and formal education (Rest & Thoma, 1976).

One of the most stinging criticisms of Kohlberg's theory came from Carol Gilligan (1982), a colleague at Kohlberg's own campus. Gilligan argued that the theory has a male bias and ignored uniquely feminine conceptions of morality. For women, says Gilligan, morality is embedded in social relationships and personal caring, which makes them appear to reach a plateau at Stage 3. To his credit, Kohlberg responded by taking a fresh look at his data for Stage 3 and Stage 4. As a result, he redefined Stage 4 by moving militant law-and-order responses (most often given by males) to Stage 3. Most subsequent studies have found no significant sex differences in moral reasoning (Walker, 1989, 1991; Walker & de Vries, 1985).

A more telling critique suggests research on moral reasoning may have limited practical value. Studies have found no close connection between people's moral reasoning and their behavior. Social psychologist Jonathan Haidt (2007) argues that most moral reasoning comes *after* people have intuitively decided how to act. Haidt's beliefs rest partially on the neuropsychology of thinking and feeling, and he points out that the human brain has two parallel systems for processing moral dilemmas. The emotion-based system is unconscious and very quick, resulting in an automatic and instantaneous "gut" feeling of right or wrong, like or dislike. The cognitive system is a little slower, so by the time it kicks in to prompt us to think rationally about the various sides of the issue, it is almost inevitably influenced by the initial unconscious emotional response. Due to such human thinking patterns as **confirmation bias**, the cognitive process often ends up merely rationalizing our initial emotional response.

## 7.10.2:  Moral Disengagement

Bullying. Terrorism. Murder. Financial fraud. How do we reconcile these immoral acts with the findings showing that most people achieve at least Kohlberg's third stage of moral reasoning? Are these heinous acts only committed by the few who remain in Stage 1 or 2—in other words, only by those who don't care about being seen as a "good person?" You might be able to make an argument for that, but then how would you explain lying, cheating, and other immoral acts people routinely commit? If you're like most people, you yourself have engaged in some behaviors that went against the grain of your own morality, yet chances are you are at or above Kohlberg's third stage. As you read in the previous section, one theorist argues that moral reasoning may be irrelevant, since we end up doing what feels good (and justifying it) anyway. There is another, more optimistic viewpoint, though. One of the most eminent psychologists alive today, Albert Bandura, offers a thought-provoking theory to shed light on these disturbing inconsistencies.

**MORAL STANDARDS INTERACT WITH SOCIAL INFLUENCE** You might remember Bandura  for his famous **Bobo doll experiments** in the 1960s, which were the first to demonstrate empirically that humans model their behavior after what we see others doing. Bandura's interest in the role of the environment on our behavior has more recently extended into the realm of moral conduct, and in

his view, almost all people have moral standards that they develop as they grow up. These standards cue us toward right and wrong, and when we behave consistently with personal standards of morality, it makes us feel good, and also provides **positive reinforcement**—thus increasing the likelihood that we'll behave morally next time. Likewise, violations of our personal moral codes prompt us to feel guilty or ashamed, which serves as a type of punishment and decreases the chance that we'll violate our moral code the next time (in order to avoid the punishment of shame or guilt). The problem in applying this to moral conduct, according to Bandura, is that these internal beliefs *interact* with our feelings and our social situations to produce our actions. Thus, our internal standards are only useful when we activate them. And sometimes, instead of activating them, we disengage from them. **Moral disengagement**, then, permits us to act outside our moral standards without feeling guilty about it.



If most people have at least basic moral development, what explains harmful acts such as this one? Albert Bandura suggests four explanations: cognitive restructuring, diffusion of responsibility, distorting the consequences, and dehumanization.

Bandura identifies four different processes that can lead to moral disengagement. As you study and think about these, consider what kind of situation a person might be in that would influence adoption of that particular strategy, and disengagement from personal moral standards.

- **Cognitive restructuring** is a powerful tool of disengagement, as it enables a different viewpoint or framework for an immoral action. Cognitive restructuring often takes the form of *moral justification,* when a perpetrator of an inhumane act mentally reconfigures the act to make it fit an alternative set of morals. So, for example, soldiers in combat might perceive killing the enemy as the greater good or a "necessary evil," thus justifying their actions. *Sanitizing language* is another type of cognitive restructuring, like using the phrase "surgical strike" for a bombing, thus creating an image of something clean and precise to override what is in reality a messy and imprecise endeavor. Employers

use sanitizing language, too, when they "downsize" rather than "firing" people. Thus, an action that is immoral becomes seen by the perpetrator as something to feel good about in the service of a higher purpose. Moral disengagement, in these scenarios, has replaced activation of personal moral standards

- **Diffusion of responsibility** occurs when responsibility for the immoral act can be shifted to someone else. Thus, instead of acknowledging one's own role in the harm caused to another person, diffusion of responsibility obscures or minimizes it. Historical evidence abounds for this strategy, in such notorious events as the Holocaust, the Cambodian "killing fields," and the Rwandan genocide of 1994. In each situation, some perpetrators stated afterward that they were only following orders of a higher-status authority figure who bore ultimate responsibility. Research in the field of **social psychology** demonstrates the powerful role of diffusion of responsibility in a variety of situations, ranging from bystanders' seeming indifference to people needing help, to the many instances revealing the power of authority to influence normal people to harm others (e.g., Darley & Latané, 1968; Zimbardo, 2007).

- **Distorting the consequences** of an immoral act enables moral disengagement by minimizing the harmful impact on the victim, or by reducing awareness of the consequences. Thus, a thief might avoid feeling guilty about stealing money from someone if he tells himself the victim is rich anyway, and thus doesn't need the money. Bandura asserts that a victim's suffering is easier to ignore when it is not visible, and points out that modern warfare often shields perpetrators from actually witnessing the effects of their deeds: instead of hand-to-hand combat, today's military battles often rely on high-tech weaponry delivered from a remote location, thus making it easier to ignore the consequences.

- **Dehumanization** relies on reducing a victim to something less than human, in order to sever the connection the perpetrator would typically feel toward another human. This, in turn, frees the offender from normal empathy toward a similar other that serves to inhibit harmful acts. History is rife with examples of this type of moral disengagement as well, ranging from the ancient Greeks' characterizations of their victims as "worms" to modern-day warfare fueled by perception of the enemy as "Satan." And dehumanization is a powerful factor in bullying.

Research examining the role of moral disengagement in inhumane actions has focused especially on bullies (both traditional and cyber), and on the individuals involved in state-mandated executions. Executioners routinely use diffusion of responsibility and cognitive restructuring, and in

some cases dehumanization as well. Jurors who hand out death sentences rely on diffusion of responsibility and distancing themselves from the consequences (by telling themselves the sentence will be appealed and thus another judge will make the final decision) (Osofsky and others, 2007). Bullies of all kinds engage in various forms of cognitive restructuring; traditional bullies also use diffusion of responsibility, and cyberbullies add distortion of the consequences (Gini and others, 2014; Pornari & Wood, 2010).

**STRATEGIES FOR OVERCOMING MORAL DISENGAGEMENT**   The growing body of research on moral disengagement helps us understand why people routinely engage in dishonest deeds without feeling guilty about it. The fact that it happens so often is the bad news. The good news is that research has also found some ways to help us resist moral disengagement, and instead act with more compassion.

One deceptively simple strategy for activating moral thinking is to sign a contract agreeing to honesty prior to an opportunity to cheat. For example, many people cheat on their taxes, and after doing so use a moral disengagement strategy to avoid feeling guilty. Researchers at Harvard Business School partnered with other prominent business schools to give participants in a laboratory experiment opportunities to cheat on two financial tasks (Shu and others, 2012). Some participants signed a statement of honesty at the end of the task, some signed the same statement at the beginning of the task, and others (the **control group**) didn't sign anything. The results? Cheating behavior was drastically reduced in those who signed the statement of honesty before the task. For those who signed after the task, their level of cheating was no different than those who hadn't signed at all. Authors of the study suggest that if tax filing documents featured the statement of honesty at the beginning of tax forms instead of at the end, it could similarly reduce tax fraud. In follow-up studies, the same group tested their "sign at the top" theory in a real-life setting, with applications for car insurance submitted by over 13,000 real-life applicants. In reporting the odometer reading of the car (which influences your insurance rate), applicants who signed the honesty statement before reporting the odometer reading were significantly less likely to "fudge" their numbers to get a better rate. Other studies report similar findings with students given the opportunity to cheat: Signing an honor code prior to the opportunity greatly reduces cheating (Shu and others, 2011). Researchers assert that their results indicate that making a commitment to moral behavior prior to an event activates one's moral thinking—which is precisely what Bandura suggests leads to consistency between moral thinking and moral behavior. Signing a statement after the deed is done, as is standard practice in many situations, does no good. At that point, the study authors conclude, "the morality train has left the station."

Key figures in a person's social environment also play a role in supporting moral behavior. Children and teens, for example, are more likely to act with compassion when their parents model compassionate behavior (Carlo and others, 2011). Peers are influential, too: Children and teens are more likely to defend someone from bullying if they have a friend who is a defender (Almeida and others, 2009). And teens who donate or volunteer their time to help others in need are more likely to engage in compassionate acts as adults (Eisenberg and others, 2014). Evidence from these studies, and many others like them, suggests that being embedded in a moral environment can act as an effective barrier to moral disengagement.



This technology helps kids report bullying, and can be used within a broader program aimed at overcoming moral disengagement by building and modeling a more compassionate environment.

# 7.11:  Social and Emotional Development

**Objective:**  Describe some of the issues faced by adolescents

As teens develop their own identity, the relative importance of others in their spheres of influence shifts. Family ties become stretched as the adolescent spends more time outside the home (Paikoff & Brooks-Gunn, 1991). What adolescents do with that time, however, depends on gender (Buhrmester, 1996). Friendships among girls are built on emotional closeness, with girls often getting together "just to talk." By contrast, friendships among boys emphasize activities, with talk centering on personal achievements or those of others.

## 7.11.1:  Psychosocial Development in Adolescence

Erik Erikson noted the emergence of an independent self in adolescence and characterized it as the essential dilemma of adolescence. This search for **identity**, Erikson asserted,

**Figure 7.9** Marcia's Stages of Identity Development

In the process of achieving one's own identity, Marcia proposed that we must actively explore options, and only commit to a personal identity after sufficient exploration.

| | | Has the individual made a *commitment* to certain beliefs, values, and interests? | |
| --- | --- | --- | --- |
| | | Yes | No |
| **Has the individual thoroughly *explored* a variety of options regarding personal beliefs, values, and interests?** | Yes | **Identity Achievement:** Commitment to personal identity as a result of significant exploration | **Identity Moratorium:** Actively exploring identity options prior to making identity commitment. |
| | No | **Identity Foreclosure:** Commitment to personal identity based on conformity to values of others (parents, peers, etc.), without having personally explored other options. | **Identity Diffusion:** Undeveloped identity, characterized by lack of interest in such matters, or indecision about them. |

can be impeded by the confusion of playing many different roles for different audiences in an expanding social world. Thus, he called this stage *identity versus role confusion.* Resolving this *identity crisis* helps the individual develop a sense of a coherent self, which in Erikson's view is essential to moving ahead successfully into adulthood. Psychologist James Marcia suggests that, as teens seek their own identities, they often experience different levels of identity development based on their degrees of *commitment* to an identity and the amount of *exploration* they have done (see Figure 7.9). While it is normal and healthy for one's identity to change throughout life, failure of the adolescent to find a satisfactory resolution for his or her identity issues may result in a self-concept that lacks a stable core. Resolution of this issue is both a personal process and a social experience (Erikson, 1963).

## 7.11.2: Gender Issues in Adolescence

Although the search for identity is universal, teen boys and teen girls encounter some challenges based on their gender. Oftentimes, these dilemmas are a product of the social norms of their particular culture and environment, and they present just one more maze that adolescents have to navigate through on their journey into adulthood. What are a few of the gender-based issues teens face in today's world?

**THE DEMISE OF GUYS** What's different about teen boys today than in previous generations? Well, for starters, they are 30% more likely to drop out of school than girls, twice as likely to be in special or remedial education programs, more likely to be obese, and more of them report feeling socially awkward—especially with the opposite sex—every year (Zimbardo & Duncan, 2012). "Guys are flaming

out academically; they're wiping out socially with girls and sexually with women," says social psychologist Philip Zimbardo in a 2011 TED Talk (Zimbardo, 2011). What is causing this widespread epidemic facing today's young men? According to Zimbardo, blaming it on the guys isn't the answer. Instead, we must look at what's going on in young men's environment that is sending them into adulthood less prepared than ever before to succeed in relationships and in the workplace.

Although it sometimes seems like technology is blamed for all of society's ills, that's not exactly the case here: Instead, it's the misuse and overuse of technology. The average teen guy spends 44 hours a week in front of a computer or television screen, creating a type of addiction Zimbardo calls arousal addiction: Essentially, these tech-stimulated teen brains, in the midst of a key time in their **plasticity** and development, are wiring themselves to seek ever-greater and different types of stimulation. They also view an average of 50 video clips of internet porn each week. As a result, they're practicing video-gaming and self-stimulation instead of interacting face-to-face with real people—thus, it's no wonder they report higher levels of social awkwardness.

Fatherlessness contributes further to the challenge young men face in making it successfully into the world of adulthood, says Nikita Coulombe, co-author with Zimbardo of the book *Man (Dis)connected* (2015): "America leads the industrialized world in fatherlessness—40% of children today are born to unwed mothers, the rate is 50% for women under 30. This in turn affects guys' school performance. Boys that grow up without fathers around do not do as well in school and are not as well adjusted socially. They're also far more likely to have attention or mood disorders and more likely to play excessive amounts

of video games." Those young men who do have fathers in their lives spend less than half an hour per week in one-on-one conversation with them.

Can anything be done, or are today's young men doomed? Zimbardo and Coulombe offer a variety of suggestions. Governments can create policies more supportive of the father's role in children's lives, from paternity leave and more equal rights for dads in divorce and custody issues to mentorship programs connecting positive male role models to boys without dads in their lives. Schools, for their part, can hire more male teachers, bring back required physical education classes to give boys time in school to burn off energy, and make education more interactive by utilizing technologies that feed boys' needs for faster-paced learning. Parents can help by giving their boys responsibilities and then helping them learn to achieve those goals, teaching them about time management, and having the courage to talk about sex and other "taboo" topics with their kids. And the media doesn't get a pass on this topic, either. For more information, check out their website at www.demiseofguys.com.

**THE SEXUALIZATION OF GIRLS**   The social norms of the 21st century—while offering more opportunities in education and the workplace for women than ever before—have also ushered in an unprecedented time of hypersexuality for girls. The popularity of the Bratz dolls, along with increasingly "sexy" clothes for young girls, were just two of the factors that prompted the American Psychological Association (2007) to take a close look at the data, the causes, and the consequences of this trend.

First, it probably comes as no surprise that women and girls are 3 times more likely than boys and men to be **sexually objectified** in the media. As a result, not only men, but women and girls as well, are starting to see themselves only through the narrow lenses of physical beauty and body image: One study found that most girls as young as 6 years old chose a "sexy" image over a "normal" image as their idealized self-image (Starr & Ferguson, 2012). And when girls or women buy into the objectifying media messages, data show that their self-esteem drops, they are at higher risk for depression and anxiety, and their rates of eating disorders increase. See Figure 7.10 for an example of the images used in the study.

What might surprise you, though, is that the amount of television the girls watched wasn't the primary contributor to the girls' preferences. Instead, the girls in the study who watched more television *and* had moms who self-objectified were the ones most likely to choose the "sexy" doll. In other words, the media messages may have laid the groundwork, but only the girls whose moms reported worrying more often about their clothes and appearance latched on to the message. Researchers suggest this points

**Figure 7.10**  The Sexualization of Girls

Girls from 6-9 years old were shown one of the doll pairs below. More than two-thirds of them chose the "sexy" image over the "normal" image when asked which one they wanted to be, and which one they thought would be more popular at school.



to the importance of moms and other parental figures in shaping girls' attitudes toward themselves. Moms who use media as "teaching moments" to talk with their daughters about various behaviors and whether scenarios were realistic or unrealistic were much less likely to have daughters who chose the "sexy" doll.

Remedies for girls' struggle for healthy identities—just like the ones of their male counterparts—can also come from all angles. Governments can develop programs fostering girls' success in other fields such as academics, sports, and the arts. Schools can develop curriculum that teaches girls to base their self-esteem on their character and their abilities, rather than their physical appearance. The media can offer more programming portraying girls as able, strong, and non-sexualized. And all adults can model respect for other based on our humanity, rather than our appearance.

## 7.11.3:  Do Parents Still Matter?

Some developmental experts argue that the effects of parents, family, and childhood become nearly lost as the adolescent peer group gains influence (Harris, 1995). In American society, the adolescent encounters new values, receives less structure and adult guidance, and feels a strong need for peer acceptance. As a result, adolescents report spending more than four times as much time talking to peers as to adults (Csikszentmihalyi and others, 1977; Larson, 2001). With their peers, adolescents refine their social skills and try out different social behaviors. Gradually, they define their social identities, the kind of people they choose to be, and the sorts of relationships they will pursue.

Are parents still important to the adolescent? The answer is an unequivocal yes. As we have seen, parents who continue to monitor their teens' activities, and maintain open and healthy communication through these years, are most likely to see their teenagers successfully navigate

In adolescence, peer relationships take on increasing importance.

the challenges of adolescence. A high-quality parent–child relationship remains the strongest predictor of adolescent mental health (Steinberg & Silk, 2002).

## 7.11.4: Is Adolescence a Period of Turmoil?

Problems with loneliness, depression, and shyness can also become significant during adolescence, which is one reason for the sharp increase in suicide among teenagers (Berk, 2004; U.S. Bureau of the Census, 2002). Studies of adolescent suicide show that the triggering experience for such a tragedy is often a shaming or humiliating event, such as failure in some achievement or a romantic rejection (Garland & Zigler, 1993). The intensity of a young person's social and personal motives, combined with the overactive emotional brain, can make it hard to keep perspective and recognize that even difficult times will pass and everyone makes mistakes.

But is adolescence inevitably a period of turmoil? It is a period in which individuals are likely to have conflicts with their parents, experience extremes of mood, and engage in risky behaviors (Arnett, 1999). For some, adolescence certainly presents overwhelming problems in relationships and in self-esteem. Yet for most teens, these years are not a time of anxiety and despair (Myers & Diener, 1995). While many parents anticipate that the relationship with their children will encounter a rocky road when the children enter adolescence, the more typical experience is relatively tranquil. In fact, the majority of adolescent youth say they feel close to their parents (Galambos, 1992). In general, those who have the least trouble are adolescents with authoritative parents—who are responsive and, at the same time, hold their children to high standards. Adolescents who have the most difficulty are more likely to come from homes where parenting is either permissive or authoritarian (Collins and others, 2000).

### Psychology Matters

## Using Psychology to Learn Psychology

- *Does your arrival at the formal operational stage, in the middle or high school years, signal the end of the cognitive line?*
- *Or will your thinking abilities continue to develop as you go on through college?*
- *If you are a returning student in your 30s, 40s, or beyond, will your cognitive development continue apace with your younger counterparts?*

A study by developmental psychologist William Perry suggests that your perspective on learning will change and mature as your college experience unfolds. This prediction is based on a sample of students Perry followed through their undergraduate years at Harvard and Radcliffe. He found that students' views of psychology and their other social science courses changed radically, as did their views of what they were there to learn (Perry, 1970, 1994).

At first, students in Perry's study had difficulty coming to grips with the diverse and conflicting viewpoints they encountered in their courses. For example, many confronted, for the first time, the idea that reasonable people can disagree—even about their most cherished "truths" concerning good and evil, God, nature, and human nature:

> A few seemed to find the notion of multiple frames of reference wholly unintelligible. Others responded with violent shock to their confrontation in dormitory chat sessions, or in their academic work, or both. Others experienced a joyful sense of liberation. (Perry, 1970, p. 4)

In dealing with this academic culture shock, Perry's students passed through a series of distinct intellectual stages reminiscent of Piaget's stages. And, although they arrived at college at different levels of cognitive maturity and continued to develop at different rates, all progressed through the same intellectual stages in the same sequence. Here are some of the highlights of this intellectual journey:

- Students at first typically see college or university as a storehouse of information—a place to learn the Right Answers. Thus, they believe it is the professor's job to help students find these answers.
- Sooner or later, students discover an unexpected—perhaps shocking—diversity of opinion, even among the experts. At this stage, college students are likely to attribute conflicting opinions to confusion among poorly qualified experts.

- Eventually, students begin to accept diverse views as legitimate—but only in the fuzzy areas (such as psychology, other social sciences, and humanities) where experts haven't yet found the Right Answers. They decide that, in subjects where the Right Answers haven't been nailed down, professors grade them on "good expression" of their ideas.

- Next, some students (not all) discover that uncertainty and diversity of opinion are everywhere—not just in the social sciences and humanities. They typically solve this problem in their minds by dividing the academic world into two realms: (a) one in which Right Answers exist (even though they haven't all been discovered) and (b) another in which anyone's opinion is as good as anyone else's. Often, at this stage, they perceive math and the "hard" sciences as the realm of Right Answers, leaving the social sciences and humanities in the realm of opinion.

- Finally, the most mature students come to see that multiple perspectives exist and are valuable in all fields of study.

The students who achieve the final stage begin to see "truth" as tentative. They now realize knowledge is always building and changing—even in the "hard" sciences. And they realize a college education is not just learning an endless series of facts. Rather, it is learning how to think critically about the important questions and major concepts of a field. In this text, we have called them "Core Concepts."

# Key Question: What Developmental Challenges Do Adults Face?

## Core Concept 7.4

**Nature and nurture continue to interact as we progress through a series of transitions in adulthood, with cultural norms about age combining with new technology to increase both the length and quality of life for many adults.**

The transition from adolescence to young adulthood is marked by decisions about advanced education, career, and intimate relationships. Making such decisions and adjusting to the consequences are major tasks of adulthood because they shape the course of adult psychological development. But development doesn't stop there. Continuing pressures of careers, families, and friends, along with the relentless physical maturation (and eventual decline) of the body, continually present new developmental challenges. In today's world, though, the traditional clock for aging has been set back, essentially "buying more time" for adults in all stages of adulthood.

This revolution in aging is a key element in the core concept for this section:

> Nature and nurture continue to interact as we progress through a series of transitions in adulthood, with cultural norms about age combining with new technology to increase both the length and quality of life for many adults.

A couple of points in our Core Concept should be noted before we examine adulthood in more depth. First, you have probably gathered from earlier sections of this chapter that stage theories—although very popular for describing human development—are often guilty of oversimplification. While the major developmental tasks and categories of leading stage theories, such as those proposed by Piaget, Kohlberg, and Erikson, are largely holding up to empirical scrutiny, psychologists now agree that development doesn't occur in rigid stages. Rather, it is a more continuous process, occurring in waves or spurts. In other words, then, the stage theories may have gotten the "what" correct, but the "when" is more fluid than they thought it was. At no time in the life span is this more true than in adult development. Research finds that healthy adults pass through a series of transitions as they progress from early through middle and into late adulthood. Successful passage through these transitions involves reflection and readjustment, which we will discuss in this section.

A second point worth noting is the changing nature of adulthood in the Western world. Thanks to better health care and technology, people are living longer than ever before and often enjoying better health in their later years than previous generations. This, in turn, is changing adults' perceptions of the life span and its various ages and stages. Fewer adults feel compelled to marry or settle down in their early 20s, or to retire when they hit 65. We are seeing the beginning of a "revolution" in aging, spawned by both nature (the longer life span) and nurture (the ways our culture is adapting to the change).

This **revolution in aging** is prompting renewed attention to the study of adult development in psychological science. Although for many years we relied on theories based on clinical observation, we are now accumulating an increasing body of empirical research. Interestingly, much of this new research supports traditional clinical theories—but it also sheds new light on the processes of adulthood in the 21st century. To see how these developmental changes unfold, let's begin with personality—where we find some surprising agreement among otherwise diverse theories.

Freud taught that adult development is driven by two basic needs: love and work. Abraham Maslow (1970) described the critical needs as love and belonging, which,

when satisfied, allow emergence of our needs for esteem and fulfillment. Other theorists divide the basic needs of adulthood into affiliation or social acceptance needs, achievement or competence needs, and power needs (McClelland, 1975, 1985; McClelland & Boyatzis, 1982). And in Erikson's theory, the early and middle adult years focus on needs for intimacy and "generativity." While all these theories offer important clues to healthy adulthood, what they all share is recognition of the need for human relationships. Because Erikson gave the most comprehensive account of adult development, we will use his theory as our framework, into which we will build recent empirical research that illuminates the course of adulthood today.

By the end of this section, you will be able to:

**7.12**  Describe the key challenges of early adulthood

**7.13**  Explain how generativity and complexity promote a healthy midlife

**7.14**  Discuss changes that typically occur in late adulthood

# 7.12: Early Adulthood: Explorations, Autonomy, and Intimacy

**Objective:**  Describe the key challenges of early adulthood

What are the developmental tasks of early adulthood? And perhaps a bigger question for 20-somethings is this: When exactly does adulthood begin? In our teen years, many of us look forward to the "freedom" of turning 18 and becoming a legal adult. But does psychological adulthood arrive at 18 as well?

## 7.12.1: Intimacy versus Isolation

Early adulthood, said Erikson, poses the challenge of establishing close relationships with other adults (look again at Table 7.1). He described **intimacy** as the capacity to make a full commitment—sexual, emotional, and moral—to another person. Making intimate commitments requires compromising personal preferences, accepting responsibilities, and yielding some privacy and independence, but it also brings great rewards. To achieve intimacy, however, the individual must resolve the conflict between the need for closeness and the fear of vulnerability and risks such closeness can bring. Failure to successfully resolve this crisis leads to *isolation* and an inability to connect with others in meaningful ways.

For Erikson, the young adult must first consolidate a clear sense of identity (resolving the crisis of adolescence) before being able to cope successfully with the risks and benefits of adult intimacy. In essence, you must know who and what you are before you can successfully commit to loving and sharing your life with someone else. However, the sequence from identity to intimacy Erikson described may not accurately reflect present-day realities. The trend in recent years has been for young adults to live together before marrying and to delay making contractual commitments to lifelong intimacy with one person. In addition, many individuals today struggle with identity issues (for example, career choices) at the same time they are trying to deal with intimacy issues. Life for young adults in the 21st century offers more choices and more complications than did the same period of life for the generation described by Erikson.

## 7.12.2: Emerging Adulthood: The In-Between Stage

Psychologist Jeffrey Arnett (2000a, 2001), in recognition of the differences between adulthood today and in previous generations, proposes a transitional period to adulthood he calls **emerging adulthood**. This period encompasses the late teens through the 20s, a time during which many individuals in industrialized societies have passed through



Traditionally, young adults found life partners and settled down to raise a family in their 20s. Today, many young adults in developed countries don't make that commitment until their 30s.

adolescence but do not yet perceive themselves to be adults. Whereas in earlier historical times, visible events such as marriage, the birth of the first child, and establishment in a career were the markers of entrance into adulthood, today's young people cite more opaque events, such as accepting personal responsibility for themselves and making independent decisions, as the important indicators of adulthood. And most emerging adults today report only partial progress toward these milestones of self-sufficiency (Arnett, 1997).

Emerging adulthood is a time of exploration and experimentation in all areas. Late teens and 20-somethings are trying out different types of work, exploring alternative lifestyles and worldviews, and figuring out what kind of person is right for them romantically. As they do so, they are less predictable in their educational pursuits, choice of residences, and degree of financial responsibility than at any other time in their life. Almost half will move out of their parents' home and back in again during this period, and while 60% start taking college classes within 1 year of graduating from high school, only half of these students have completed 4 or more years by their late 20s (Bianchi & Spain, 1996; U.S. Bureau of the Census, 2011). Of those who do graduate from college, more are choosing graduate school than in previous generations (Mogelonsky, 1996). Young adults also take more risks than at any other time of their life—including adolescence. Rates of alcohol and substance abuse, reckless driving, and unprotected sex peak during these years (Arnett, 1992). These patterns of experimentation may be due to the absence of serious role responsibilities combined with freedom from parental supervision and the still-developing **frontal cortex** as a moderator of impulsive actions.

Did Erikson get it right, then, in his identification of the major tasks of adolescence and early adulthood? In general, he did. Although it is not widely noted, he observed that, in industrialized societies, young people seemed to enjoy what he called a prolonged period of adolescence during which role experimentation continued. This, indeed, is exactly what empirical research such as Arnett's is demonstrating today. And current studies indicate that, by about age 30, a majority of Westerners have married and had their first child, have made the transition from school to full-time work, and perceive themselves as having entered adulthood. Presumably, then, at this point they have achieved the intimacy that Erikson described as the major developmental task of early adulthood. Notably, young adults today also name intimacy, or personal relationships, as the key to a happy life (Arnett, 2000b), although many admit struggling to balance the competing needs of intimacy and autonomy. As we will see, this pursuit of an optimal balance of these two needs will continue to characterize later phases of adulthood.

### 7.12.3: Modern Approaches to Intimacy

How, then, do today's adults achieve intimacy? Though 90% or more still marry, marriage often occurs more than once in an individual's life. The same pattern applies to gay and lesbian long-term relationships—whether they may legally marry or not (Knox & Schact, 2008). In fact, about half of all U.S. marriages end in divorce (U.S. Bureau of the Census, 2002). Moreover, an increasing number of couples are cohabiting rather than getting married (Doyle, 2002b). The high divorce rate probably results, in part, from individuals seeking intimacy before they have resolved their own identities. Unrealistic expectations of each other and of what constitutes an ideal marriage and family structure contribute to divorce as well (Cleek & Pearson, 1985), as does our cultural priority on individual happiness. On the other hand, there is evidence that communication and affection between spouses is better than it was in earlier times, and that those who learn good communication skills substantially improve their chances of avoiding divorce (Caplow, 1982; Markman & Notarius, 1993).

In the 21st century, married people are more likely to see each other as partners and friends and less likely to feel constrained by society's expectations of a "husband" or "wife." Partners in **peer marriages** talk with and help each other in ways that work best for their relationship, irrespective of traditional ideas about the man being "boss" or the wife being responsible for "women's work" (Schwartz, 1994). The key to a fair and satisfying relationship is communication in which both partners feel able to openly express their hopes and fears (Klagsbrun, 1985). A mushrooming of knowledge on how good communication sustains relationships has helped our culture to view marriage as a worthwhile investment and see therapy as a valuable option for supporting such efforts (Gottman, 1994; Notarius, 1996). In brief, relating is no longer viewed as a set of skills that "comes naturally" with the establishment of intimacy. Instead, close relationships are seen as lifelong works in progress—worthwhile investments of time and energy whose quality can be improved with clearer self-understanding, effective conflict resolution, and good communication.

What makes for good communication and effective conflict resolution? Surprisingly, there is no correlation between the frequency of a couple's conflicts and the health of their relationship: Couples who disagree often

are no more likely to divorce than couples with less frequent conflict. What does matter is the ratio of positive interactions to negative interactions, with the optimal balance found to be 5:1 (Gottman, 1995). In other words, regardless of how much conflict there is in a marriage, the marriage will be healthy if the couple has five times more positive than negative interactions with each other. And "positive interactions" don't have to be long romantic weekends or elaborate dates: small things such as a smile, a kiss, a compliment, or a thank-you all count. (A long romantic weekend or a great date would, then, presumably have quite a few positive interactions.) Negative interactions, on the other hand, can also be small—but pack a powerful punch—and include such behaviors as hostile sarcasm, name calling, a frustrated roll of the eyes, or an angry slam of the door. By maintaining a 5:1 ratio of positive to negative interactions, the couple is creating a supportive foundation that strengthens the relationship's immune system, so to speak. When conflict does arise, then, partners are less likely to take things personally or feel defensive, which allows the focus to remain on problem solving rather than blaming. For an excellent list of suggestions to help you achieve the 5:1 ratio, take a look at Figure 7.11 (see p. 276).

# 7.13: The Challenges of Midlife: Complexity and Generativity

**Objective:**   **Explain how generativity and complexity promote a healthy midlife**

For many people, the concept of midlife conjures up thoughts of the dreaded midlife crisis and birthday cards poking fun at being "over the hill." Contrary to stereotypes of middle age, though, research finds middle adulthood to be a peak period of development in many respects. Cognitively, many adults in this age range have developed considerable skill in combining and integrating a variety of thinking styles, including reflection, analysis, and dialectical reasoning (which is the ability to compare and evaluate contradictory viewpoints; Baltes & Staudinger, 1993; King & Kitchener, 1994). They are also experts at integrating their cognitions and emotions, resulting in more thoughtful, deliberate, and reflective coping responses to stressful events (Diehl and others, 1996).

Taken together, these skills enable the midlife adult to juggle a variety of interests, which often include work, family, community, hobbies, and self-care. And indeed,

this busy, complex lifestyle is what characterizes healthy midlife adults today. Psychologists Rosalind Barnett and Janet Hyde (2001) note that dual-career families are now the norm, with women receiving professional training at an unprecedented level. Hand in hand with this trend is greater fluidity among roles as worker and family member: Men less often define themselves only as workers and family providers, and women are less likely to define themselves solely as wives and mothers. For most people, these expanded roles provide a greater network of social support and an increased sense of well-being. In addition to greater diversity in roles, midlife adults today enjoy greater variety in their relationships, resources, and lifestyle than ever before (Moen & Wethington, 1999). This *complexity* is related to well-being in that complex individuals see life as a series of challenges, full of variety, that lead to growth (Ryff & Heincke, 1983). And, overall, adults over age 50 are less stressed, more happy, and less worried than younger individuals (Stone and others, 2010).

## 7.13.1:  Generativity versus Stagnation

According to Erikson, **generativity** is the major developmental task of middle adulthood. For those who successfully met the earlier challenges of identity and intimacy, generativity provides an opportunity to make a meaningful and lasting contribution to family, work, society, or future generations. Thus, people in this phase of life broaden their focus beyond self and partner, often by raising children, serving as volunteers in community service groups, or nurturing the next generation in some other way. Research confirms that adults who express a strong sense of being generative and productive also report high life satisfaction (McAdams and others, 1993). In contrast, those who have not resolved earlier crises of identity and intimacy may experience a "midlife crisis." Such people may question past choices, becoming cynical and stagnant or, at the other extreme, self-indulgent and reckless. The good news is—once again contrary to stereotypes of midlife—most people do not undergo a midlife crisis. What's more, the idea that adults become depressed and lose direction when their children "leave the nest" is also a myth (Clay, 2003a, 2003b).

## 7.13.2:  Transitions

What does happen for most adults in midlife is that they progress through a **transition** that involves redefining, or transformation, of a life role. Indeed, evidence indicates

**Figure 7.11** Gottman Repair Checklist

Communication and relationship expert Dr. John Gottman suggests these strategies to help couples navigate effectively through emotional discussions. Couples who utilize these repair strategies have longer and more satisfying relationships.

✔ **Gottman Repair Checklist**

**I Feel**

1. I'm getting scared.
2. Please say that more gently.
3. Did I do something wrong?
4. That hurt my feeling.
5. That felt like an insult.
6. I'm feeling sad.
7. I feel blamed. Can you rephrase that?
8. I'm feeling unappreciated.
9. I feel defensive. Can you rephrase that?
10. Please don't lecture me.
11. I don't feel like you understand me right now.
12. Sounds like it's all my fault.
13. I feel criticized. Can you rephrase that?
14. I'm getting worried.
15. Please don't withdrw.

**Sorry**

1. My reactions were tooo extreme. Sorry.
2. I really blew that one.
3. Let me try again.
4. I want to be gentler to you right now and I don't kow how.
5. Tell me what you hear me saying.
6. I can see my part in all this.
7. How can I make things better?
8. Let's try that one over again.
9. What you are saying is…
10. Let me start again in a softer way.
11. I'm sorry. Please forgive me.

**Get to Yes**

1. You're starting to convince me.
2. I agree with part of what you're saying.
3. Let's compromise here.
4. Let's find our common ground.
5. I never thought of things that way.
6. This Problem is not very serious in the big picture.
7. I think yoour point of view makes sense.
8. Let's agree to include both our views in a solution.
9. What are your concerns?

**I Need to Calm Down**

1. Can you make things safter for me?
2. I need things to be calmer right now.
3. I need your support right now.
4. Just listen to me right now and try to understand.
5. Tell me you love me.
6. can I have a kiss?
7. Can I take that back?
8. Please be gentler with me.
9. Please help me calm down.
10. Please be quiet and listen to me.
11. This is important to me. Please listen.
12. I need to finish what I was saying.
13. I am starting to feel flooded.
14. can we take a break?
15. Can we talk about something else for a while?

**Stop Action!**

1. I might be wrong here.
2. Please let's stop for a while.
3. Let's take a break.
4. Give me a moment. I'll be back.
5. I'm feeling flooded.
6. Please stop.
7. Let's agree to disagree here.
8. Let's start all over again.
9. Hang in there. Don't withdraw.
10. I want to change the topic.
11. We are getting off track.

**I Appreciate**

1. I know this isn't your falult.
2. My part of this problem is…
3. I see your point.
4. Thank you for…
5. That's a good point.
6. We are both saying…
7. I understand.
8. I love you.
9. I am thankful for…
10. One thing I admire about you is…
11. I see what you're talking about.
12. this is not your problem, it's OUR problem.

that adult life is characterized by a series of transitions, starting with the transition to adulthood and occurring perhaps every 15 to 20 years throughout adulthood (Levinson, 1986; Sugarman, 2001). Successful transitions typically involve a period of heightened self-reflection, which includes reappraisal of the current role, exploration of new possibilities offering a renewed sense of meaning, and the decision to let go of the old role and commit to the new one. Transitions may involve expected events such as getting married, having children, or retiring, or unexpected

events such as a sudden illness, breakup, or loss of a job or loved one. In addition, events that were expected but did not occur—such as a job promotion that never materialized or a person who always wanted children but never had any—can prompt a transition. And finally, transitions can be gradual, as with a relationship or job that, over time, becomes less and less fulfilling, or a person who becomes increasingly self-confident: In any case, at some point the individual becomes aware of a critical difference, which propels him or her into the transition period.



Engaging in new challenges is one of the keys to successful passage through the transitions of adulthood. This woman earned her master's degree in elementary education at the age of 52.

Given that our physical, cognitive, and emotional capabilities—as well as our social contexts—tend to evolve and change throughout our lives, transitions are a natural response to these shifts in our internal and external worlds. And there is accumulating evidence that adults who live the longest and healthiest lives are the ones who successfully navigate through these transitions and emerge from each one with a renewed sense of meaning and passion for life (Levinson, 1978, 1996; Ryff & Heidrich, 1997). Interestingly, transitions may sometimes involve a revisit to one of Erikson's earlier stages, such as a retooling of one's identity or the transformation of an intimate relationship. And, given what we know about complexity, we might predict that complex individuals—with their positive, challenge- and growth-oriented outlook—would be more likely to experience successful transitions.

In summary, the reality of middle adulthood in today's Western society is a far cry from the "over-the-hill" stereotype that still persists in some people's minds. Many midlife adults are energetic, forward-moving individuals who are making meaningful contributions to the world and enjoying the many opportunities available to them in love, work, and personal growth. And it appears to be generativity and complexity that fuel achievement of this healthy model of middle adulthood.

# 7.14: Late Adulthood: The Age of Integrity

**Objective:** Discuss changes that typically occur in late adulthood

At the beginning of the 20th century, only 3% of the U.S. population was over 65. One hundred years later, that figure was about 13%. And as the Baby Boom generation continues to reach this age over the next few years, nearly one-fourth of our population will be in this oldest group.

By the year 2030, we will witness a profound demographic shift (change in population characteristics). By that time, more than 80 million Americans will be over 60 years of age. For the first time in history, the number of people in the 60-plus age group will outnumber those under 20 years of age. This will represent a dramatic reversal of all previous demographics and a potentially significant shift away from today's youth-oriented culture (Pifer & Bronte, 1986). Among the effects: Tattoos and body piercings will become common in nursing homes, and there will be far fewer people to pay Social Security and Medicare bills.

With drastic changes in our society's age distribution looming, it is more crucial than ever to understand the nature of aging as well as the abilities and needs of the elderly (Roush, 1996). And, on a personal level, it may be helpful to anticipate some of the developmental challenges your parents and grandparents are facing, as well as what you can expect in the last phase of your life.



Late adulthood isn't what it used to be. Physical activity increases life span and improves health, even if a person begins to exercise in their 80s. It also increases cognitive functioning and life satisfaction.

From a biological perspective, aging typically means decline: Energy reserves are reduced, and cell machinery functions less efficiently. From a cognitive perspective, however, aging is no longer synonymous with decline (Qualls & Abeles, 2000). Many abilities, including expert

skills and some aspects of memory, can actually improve with age (Azar, 1996; Krampe & Ericsson, 1996). A lifetime's accumulation of experience may finally culminate in wisdom—if the mind remains open and active. Activity, in fact—whether physical, social-emotional, or cognitive—seems to be key to healthy aging: The phrase "Use it or lose it!" applies to many aspects of late adulthood. Thus, theories of aging are models of balance or trade-offs: In old age, a person may lose energy reserves but gain an ability to control emotional experiences and thereby conserve energy (Baltes, 1987). And many of our negative assumptions about aging are related to our cultural values: Cultures that revere their elders have very different perspectives and expectations of aging. What are the tasks of aging, and what opportunities and limitations will we confront in our later years?

### 7.14.1:  Ego-Integrity Versus Despair

According to Erikson, an increasing awareness of your own mortality and the changes in your body, behavior, and social roles sets the stage for late adulthood. Erikson called the crisis of this stage *ego-integrity versus despair.* **Ego-integrity**, the healthy end of this dimension, involves the ability to look back on life without regrets and to enjoy a sense of wholeness. It requires reflection on times both good and bad, with appreciation for what turned out well and acceptance of what did not. By now, you know that Erikson believed previous crises must have enjoyed successful resolutions in order to master new challenges, so you are probably considering how a well-developed identity, meaningful close relationships, and a sense of having contributed to the next generation would probably facilitate this type of reflection and acceptance. For those whose previous crises had unhealthy solutions, however, aspirations may remain unfulfilled, and these individuals may experience futility, despair, and bitterness. Sadly, they often then fail to resolve the crisis successfully at this final developmental stage.

### 7.14.2:  Physical Changes

Some of the most obvious changes that occur with age affect people's physical appearances and abilities. As we age, we can expect our skin to wrinkle, our hair to thin and gray, and our height to decrease an inch or two. Our hearts and lungs operate less efficiently, decreasing our physical stamina. We can also expect some of our senses to dull. More and more, however, modern life is finding older adults taking control of their bodies in ways that are reducing the deterioration long thought to be inevitable. Successful aging takes into consideration both individual potential and realistic limits (Baltes, 1993).

To what extent can older adults influence their physical aging? Continuing (or even beginning) a consistent pro-

gram of physical exercise helps ward off some of the physical decline typically associated with aging. Aerobic activity such as walking or swimming improves cardiovascular functioning, and weight training improves blood flow and builds muscle mass, which in turn improves posture, balance, and the ability to physically manage everyday activities (such as grocery shopping or gardening). Even for individuals who have previously been sedentary, beginning an exercise program as late as age 80 results in measurable gains physically, emotionally, and even cognitively. Regular exercise provides better blood and oxygen flow to the brain, which in turn reduces deterioration of brain cells and improves attention (Colcombe and others, 2004). There is also evidence that exercise reduces incidence of Alzheimer's and other brain disorders (Marx, 2005).



Contrary to Western stereotypes, over half of adults in their 70s are still sexually active. What's more, research shows that sexual satisfaction is linked to mental sharpness.

Another myth about aging in Western culture is that elderly people cannot or should not be sexually active. Belief in this myth can be a greater obstacle than any physical limitations to experiencing satisfying sex in late adulthood. Although frequency and desire may decrease somewhat, there is no age, for either men or women, at which the capability for arousal or orgasm ceases. (This is particularly true now that drugs, such as the well-advertised Viagra, have enhanced erectile ability for millions of older men.) And while sex loses its reproductive functions in late adulthood, it doesn't lose its capacity for providing pleasure. Regular sex also enhances healthy aging because it provides arousal, aerobic exercise, fantasy, and social interaction (Ornstein & Sobel, 1989). Experience and creativity can compensate for physical changes or loss of physical stamina.

### 7.14.3:  Cognitive Changes

Older adults often fear that aging is inevitably accompanied by the loss of mental abilities. But is this fear justified? Certain parts of the brain, particularly the frontal lobes, do lose mass as we age, but there is little evidence this causes a general mental decline in healthy adults. On one hand, performance on tasks requiring imagination,

such as vivid imagery strategies for memorizing, does seem to decline with age (Baltes & Kliegl, 1992). And people do acquire information more slowly by the time they are in their 70s and 80s. But on the other hand, the decline for the average person may not be as severe as folk wisdom assumes (Helmuth, 2003c). Brain-imaging studies reveal that older people's brains compensate for decline by processing information differently, bringing more regions into play (Cabeza, 2002; Helmuth, 2002). And, just like physical exercise prolongs physical health, mental exercise keeps aging brains working more effectively. Moreover, some abilities improve with age. Vocabulary, for example, is consistently better in older adults, as are social skills. And, with regard to skilled performance, musicians have been shown to improve well into their 90s (Krampe & Ericsson, 1996). Psychologists are now exploring age-related gains in wisdom, such as expertise in practical knowledge and life experience (Baltes, 1990). Finally, we note persistent evidence that physical exercise improves learning, memory, and other cognitive functions in older adults, along with new research showing that consumption of omega fatty acids can combine with physical exercise to produce exponential benefits to brain functioning and plasticity (Chodzko-Zajko and others, 2009; van Praag, 2009). The message is clear: More active elders enjoy better cognitive and better physical health.

What about memory? A common complaint among older adults is that their ability to remember things is not as good as it used to be. Most of these age-related memory difficulties appear in the part of the memory system associated with processing and storing new information (Poon, 1985); aging does not seem to diminish access to knowledge or events stored long ago. So an elderly person may have to ask the name of a new acquaintance several times before finally remembering it, but have no trouble recalling the names of old friends. A more important concern might be that people explain memory loss differently depending on the age of the forgetful person. Using a double standard, we may attribute young adults' memory failures to lack of effort but those of older adults to loss of ability (Parr & Siegert, 1993). We may also fall prey to **confirmation bias**: If we assume older people forget more, we will notice and remember when one does and chalk it up to age, whereas when a younger person forgets something, we either dismiss it or attribute it to something situational.

Particularly worrisome to older people and those who love them is **Alzheimer's disease**, a degenerative disorder of the brain that produces diminished thinking abilities, memory problems and, ultimately, death. Alzheimer's disease is estimated to occur in about 10% of the population over the age of 65, with the incidence increasing with age to more than 50% in people beyond age 85 (National Insti-

tute on Aging, 2004). One of the early symptoms involves memory problems, causing many older persons to become anxious when they are unable to remember a name or an event—a difficulty to which they would have given little thought when younger. It is an especially frightening disorder because it can render people helpless, rob them of their ability to make new memories, and make them forget loved ones. New advances in Alzheimer's research, though, are making some promising headway into our understanding and treatment of this serious disorder. In fact, new tests can identify Alzheimer's disease with a remarkably high accuracy rate—years before symptoms even appear (DeMeyer and others, 2010). And although a cure has not yet been discovered, early diagnosis and treatment can now slow the progress of the disease, thus extending the quality of life of an individual with Alzheimer's disease.

## 7.14.4: Social and Emotional Changes

The social and emotional state of older adults is another area rife with misconceptions and stereotypes of grumpy and isolated old folks. While it is true that an unfortunate consequence of living a long life is outliving some friends and family members, research finds older adults largely maintaining healthy emotions and social relationships. Stanford University professor Laura Carstensen notes that, as people age, they tend to engage in **selective social interaction**, maintaining only the most rewarding contacts for the investment of their physical and emotional energy (Carstensen, 1987, 1991; Lang & Carstensen, 1994). Maintaining even a single intimate relationship can markedly improve personal health, as can living with a beloved pet (Siegel, 1990).



These women aren't just having coffee together—they are also helping themselves live longer and healthier lives by enjoying their social relationship and interaction with each other.

Older adults also seem to benefit from emotional systems that, in some ways, grow keener with age. One recent study found that older adults felt greater sadness than middle or younger adults when exposed to sad movie

scenes (Seider and others, 2010). At the same time, though, older adults feel more positive emotions and fewer negative emotions than their younger counterparts (Mroczek, 2001). How do we reconcile these seemingly contradictory findings? According to Carstensen (1987, 1991), older adults manage their emotions by seeking out positive environments and avoiding the negative ones (Sanders, 2010). Moreover, they enjoy a broader perspective on their experiences, probably as a result of their assortment of life experiences. They are more likely to take disappointment in stride, bounce back from personal criticism, and focus on the positive. Overall, most older adults feel satisfied with life and enjoy fairly high levels of well-being (Charles & Carstensen, 2010).

How do older adults characterize well-being? In a series of interviews with middle-aged and older adults, Ryff (1989) found that both men and women defined well-being in terms of relationships with others: They strived to be caring, compassionate people and valued having a good social support network. The keys to well-being, according to these interviews, are accepting change, enjoying life, and cultivating a sense of humor.

## 7.14.5: Keys to Successful Aging

What other strategies are effective in coping with aging? Older adults can remain both active and close to people by doing volunteer work in the community, traveling, joining clubs and classes, or spending time with grandchildren. Much research supports this notion of the need for close relationships with others. And it is the basis for one of the most practical applications you can take with you from this text: *Anything that isolates us from sources of social support—from a reliable network of friends and family—puts us at risk for a host of physical ills, mental problems, and even social pathologies.* We are social creatures, and we need each other's help and support to be effective and healthy (Basic Behavioral Science Task Force, 1996). In addition, we might learn lessons from other cultures where older citizens are respected and venerated for their wisdom. Before this happens, however, people must overcome stereotypes of the elderly as incapable and incompetent (Brewer and others, 1981).

Successful aging, then—much like success at any age—seems to consist of making the most of gains while minimizing the impact of losses (Schulz & Heckhausen, 1996). Additionally, it is helpful to realize that loss of specific abilities need not represent threats to one's sense of self. As one's physical and psychological resources change, so do one's goals (Carstensen & Freund, 1994). From this perspective, late adulthood is a time of increasing fulfillment. If you ask adults in midlife and beyond if they wanted to be 25 again, "you don't get a lot of takers," notes researcher Arthur Stone (Fields, 2010).

## A Look Back at the Jim Twins and Your Own Development

Now that you have learned some key elements of human development over the life span, what conclusions can you draw about why each of us develops into the individuals we are? By now, you have enough knowledge about the interaction of genes and environment to know that neither, on its own, can account for a person's outcomes. Both play key roles, often at different stages of development. But can you apply what you've learned to your own outcomes? First, let's try our hand at explaining the Jim twins, whom we met in the introductory section of this chapter.

To see the twin pairs in a broader perspective, you need to know that they are "outliers"—extreme among the twins studied at Minnesota, even though they have received a lion's share of media coverage. Although Bouchard and his colleagues found many unexpected developmental similarities between individuals in all the twin pairs they studied, most were not nearly so much alike as Oskar and Jack or the Jims. Moreover, even Bouchard acknowledges that many of the similarities are just coincidences ("The Mysteries," 1998). And while mere coincidence does not offer a dazzling explanation, the alternatives seem absurd. No one seriously suggests, for example, that the names of Betty and Linda could have been written into the genes of the two Jims or that heredity really specifies storing rubber bands on one's wrists.

The real story, then, is both less dramatic and more important: Identical twins do show remarkable similarities, but mainly in the characteristics you might expect: intelligence, temperament, gestures, posture, and pace of speech—all of which do make sense as genetically influenced traits. And the fact that fraternal twins and other siblings show fewer similarities also suggests that hereditary forces are at work in all of us, whether we are twins or not. Bouchard (1994) himself takes a rather extreme position, suggesting that heredity accounts for up to 80% of the similarities observed among identical twins. Critics aren't so sure.

What objections do critics raise concerning the twin studies Bouchard and others have been conducting?

- First, they note that, stunning as the similarities between identical twins may seem, the effects of the environment also show up in twin pairs. None of them displays behavior that is identical across the board. And the fact that twins reared together typically are more alike than those reared apart provides additional testimony to the effects of environment. Furthermore, the personalities of most twin pairs become less alike as they age, providing even greater evidence that the environment, as well as heredity, continues to shape development (McCartney and others, 1990).

- We should note, too, that many of the twin pairs studied by Bouchard had been reunited for some time before he found them—an environmental condition that could easily accentuate, or even create, similarities. This was true, for example, of Oskar Stör and Jack Yufe, the Nazi and

Jewish twins, who met 5 months before Bouchard got to them. In fact, says psychologist Leon Kamin, Bouchard's twins face strong incentives to exaggerate their similarities and minimize their differences to please the research team and to attract media attention (Horgan, 1993). (Since their story broke in the press, Stör and Yufe have hired agents, made paid appearances on TV, and sold their story to a Hollywood film producer.)

- A third criticism points out that because identical twins look alike, people often treat them alike. This is an environmental factor that can account for many similarities in behavior. For example, attractive people generally are seen by others as more interesting and friendly, which in turn elicits friendliness from others—and ultimately leads to different outcomes than would be found in less attractive individuals, whether or not they have been raised together. The resulting similarity, then, can be due to environment as much as it is to heredity.

- Finally, critics also remind us that scientists' hopes and expectations can influence their conclusions in this sort of research. Because Bouchard and other investigators of identical twins expect to find some hereditary influences, their attention will be drawn more to similarities than to differences. In fact, this is what most people do when they meet: Their conversation jumps from topic to topic until they discover common interests, attitudes, experiences, or activities.

So, is there any point of consensus about the twin studies and the effects of heredity and environment? Bouchard and his critics alike would agree that neither heredity nor environment ever acts alone to produce behavior or mental processes. They always interact. Thus, from a developmental perspective, heredity and environment work together to shape an individual throughout a person's life—in all the ways we have noted throughout this chapter.

# Critical Thinking Applied: The Mozart Effect



Does playing classical music for your unborn child or newborn really improve their IQ?

Imagine this: You have just had your first child and are now the proud parent of what you are sure is the most amazing baby ever born (we aren't making fun of you—we all feel that way about our kids!). Like many parents, you want to offer your child every opportunity you can to help him (or her) reach full potential. So what would you do if you heard that listening to Mozart would make your baby smarter? In 1993, this provocative finding was announced by a pair of scientific researchers who, indeed, found that listening to Mozart boosted IQ scores (Rauscher and others, 1993). The report received widespread media coverage and gave birth to a host of innovations. Governors in at least two states instituted requirements to provide a Mozart CD to every newborn; websites sprang up that sold all things musical with promises of transforming the listener's "health, education, and well-being" (www.themozarteffect.com); and expectant mothers began to play Mozart to their unborn children via headphones on their tummies. Before jumping on the bandwagon, though, it might be wise to apply some critical thinking to this remarkable claim.

## What Are the Critical Issues?

Could listening to Mozart really improve IQ? If the study appears valid, how does the new finding fit with other established findings about effects of music and about boosting intelligence? Would other types of music—classical or otherwise—have similar effects? And finally, if listening to a certain type of music really does boost IQ, can we be sure it is the music itself boosting the IQ, or could it be something else about the experience of listening to music that was driving the IQ gain? These are just a few of the questions that a good critical thinker might ask when first hearing this remarkable claim.

## Extraordinary Claims Require Extraordinary Evidence

The first thing that might come to mind for you is the extreme nature of this assertion: The original study reported that IQ scores increased by 8 to 9 points after listening to just 10 minutes of Mozart! Is there extraordinary evidence to support this *extraordinary claim?* An inspection of the *source* reveals the claimants are researchers at a respected university, which lends initial credibility to their assertion. What, then, is the nature of the *evidence?* First, the finding was indeed based on an empirical study rather than anecdotal evidence, so it passes that test. A second element of the evidence to examine is the sample: Who were the participants, and how well do they represent the population at large? In this case, participants were college students, which might give you pause. Would the findings necessarily apply to babies? Or could the effect be limited to people already at a certain level of cognitive development?

## Does the Reasoning Avoid Common Fallacies?

One common fallacy is the *correlation–causation* issue. In this study, researchers used an experimental design with random assignment to groups, so the findings do appear causal rather than correlational in nature. Even when the findings of a study are valid, though, another common fallacy can occur when they are interpreted in a manner that oversimplifies or exaggerates the meaning of the findings. In this case, is it reasonable to conclude from the findings of this study that listening to Mozart boosts IQ?

Here's where it gets really interesting: A closer look at the findings reveals the IQ gain found in the study was only temporary and disappeared after about 15 minutes. And, second, the measure used to assess IQ (which by definition is a global measure) was actually a test of visual–spatial competence (which is just one specific element of IQ tests). To say that Mozart boosts intelligence is clearly an exaggeration of the actual findings.

## What Conclusions Can We Draw?

In the years following the original study, more than 20 similar studies have been conducted and published in recognized scientific journals. While a few found evidence of what has become popularly known as "the Mozart effect," most did not (Steele and others, 1999). In fact, in-depth studies of the process reveal that the short-term boost in IQ score is more accurately a result of a slight increase in positive mood reported by most participants when listening to the particular Mozart composition used in many of the studies: *When mood was measured before and after listening to the music and statistically removed from the equation, the temporary IQ increase disappeared* (Thompson and others, 2001). What's more, other mildly

positive experiences, such as listening to a story rather than sitting in silence for 10 minutes, produce the same increase in mood and subsequently the same temporary IQ gain (Nantais & Schellenberg, 1999).

A more reasonable conclusion of these studies is that experiences that increase positive mood facilitate better visual–spatial reasoning while the mood remains elevated. This finding, contrary to the "Mozart effect" claim, is corroborated by other psychological research. Some studies, for example, have uncovered a relationship between positive mood and performance on cognitive tasks (Ashby and others, 1999; Kenealy, 1997). And listening to music that promotes happiness has been found to increase speed and productivity on a variety of tasks.

To be fair, it wasn't the original research report that exaggerated the findings or implied they would apply to babies, but media reports that proliferated in the wake of the research. Stanford University professor Chip Heath thinks he knows why: His analysis reveals that the original 1993 article received far more attention in newspaper sto-ries than any other research report published around that time, and the greatest coverage in states with the lowest student test scores. "Problems attract solutions," says Heath, and Americans as a culture seem more obsessed with early childhood education than many other cultures worldwide (Krakovsky, 2005).

The anxiety noted by Heath can breed **emotional bias**, which in turn can influence people to latch on to solutions that seem simple and promise grand results. Add to that findings from memory research indicating that each time a story is told by one person to another, details become distorted—and can you imagine how many people read a newspaper article (which likely distorted the original finding), then told a friend, who told another friend, and so on? It's no wonder the myth of the Mozart effect took such a strong hold in our culture. And finally, the confirmation bias helps us understand why people still persist in believing the Mozart effect to be true, despite research reports and newspaper articles that have debunked it.

# Summary: Development Over the Life Span

## Chapter Problem

Do the amazing accounts of similarities in twins reared apart indicate we are primarily a product of our genes? Or do genetics and environment work together to influence growth and development over the life span?

- Dramatic media stories, such as that of the Jim Twins, represent the most unusual cases of similarities among identical twins raised apart. Moreover, any two individuals reared in the same culture will most likely find some "amazing" coincidences in their beliefs, attitudes, experiences, or behaviors.

- Many of our physical characteristics are primarily genetic. Of our psychological characteristics, traits such as intelligence, temperament, and certain personality traits—currently known to be some of the most strongly genetically influenced traits—can only be partly attributed to our genetic inheritance.

- Throughout our lives, from conception to death, our environments play a strong role in development of all our psychological characteristics.

- Twin studies and adoption studies help psychologists tease out the differences between the influences of nature and nurture on development.

## What Innate Abilities Does the Infant Possess?

> **Core Concept 7.1**
>
> **Newborns have innate abilities for finding nourishment, avoiding harmful situations, and interacting with others—all of which enable survival.**

From the moment of conception, genetics and the environment interact to influence early development. During the 9-month **prenatal period**, the fertilized egg **(zygote)** becomes an **embryo** and then a **fetus**. **Teratogens** are harmful substances taken in by the mother that can cause damage to the developing fetus. Development of sensory abilities and basic reflexes begins in the prenatal period, and at birth newborns prefer sweet tastes and familiar sounds and have visual abilities ideally suited for looking at faces. **Innate reflexes** such as grasping and sucking help them survive and thrive, as does their ability for **mimicry**. The newborn brain contains some 100 billion neurons.

**Infancy** spans the first 18 months of life. **Maturation** refers to the genetically programmed events and timeline of normal development, such as crawling before walking and babbling before language development. And while exposure to a rich variety of stimuli in the environment

promotes optimal brain development and can speed up the "average" pace of development, the **genetic leash** limits the degree to which the environment plays a role. Neural development in infancy is rapid, characterized by **synaptic pruning** and **sensitive periods**. Poverty can drastically impact neural development.

Infants need human contact to survive and thrive, and their innate sensory abilities, reflexes, and mimicry promote development of social relationships. During infancy, they establish a close emotional relationship with their primary caregiver, which lays the foundation for the way they perceive and interact in close relationships later in their lives. This attachment style is **secure**, **anxious-ambivalent**, or **avoidant**, and it is influenced by both the child's temperament and the responsiveness and accessibility of the primary caregiver. Erikson referred to this first stage of social development as **trust versus mistrust**. Cultural practices and preferences regarding attachment style vary, illustrating the role of the environment in development. The role of play also varies among different cultures and impacts development of children's **executive function**.

## What Are the Developmental Tasks of Childhood?

> ### Core Concept 7.2
>
> **Nature and nurture work together to help children master important developmental tasks, especially in the areas of language acquisition, cognitive development, and development of social relationships.**

The rapid development of language ability is one of the most amazing developmental feats of early childhood. There is widespread agreement that we are born with innate mental structures that facilitate language development, which Chomsky called **language acquisition devices (LADs)**. While all normally developing infants will acquire language on a relatively predictable timeline—as long as they are exposed to language in their environment—the specific language they develop depends on the language(s) to which they are exposed and can be verbal or sign language. Frequency of exposure can also modify the pace of language development. Babbling begins at about 4 months of age and is the first step toward language development. **Grammar, telegraphic speech**, and use of **morphemes** follow over the next few years.

**Cognitive development** refers to the emergence of mental abilities such as thinking, perceiving, and remembering. Jean Piaget proposed the most influential model of cognitive development, which suggests that children progress through four distinct stages, each of which is characterized by identifiable changes in mental abilities. Throughout the stages, **schemas** form the mental frameworks for our understanding of concepts, and these schemas are modified by **assimilation** and **accommodation** as we acquire new information. The **sensorimotor stage** is characterized by the emergence of goal-directed behavior and object permanence, while the subsequent **preoperational stage** is marked by egocentrism, animistic thinking, centration, and irreversibility. A **theory of mind** is apparent by this stage as well. Progression beyond the limitations of the preoperational stage marks the beginning of the **concrete operations stage**, during which children master conservation. Piaget's fourth stage doesn't begin until adolescence. Although many of Piaget's observations have withstood the test of time, today's researchers note that children progress more rapidly and less abruptly through the stages than Piaget believed. Vygotsky's theory of cognitive development notes the importance of culture in development and adds the concepts of **scaffolding** and a **zone of proximal development** to our understanding of how children's mental processes develop.

The third developmental task of childhood is development of social relationships. Our basic temperament, present at birth, plays a strong role in our socioemotional development; but, like most other abilities, it can be modified by support or challenges in our environment. **Socialization** refers to the process by which children learn the social rules and norms of their culture, and parenting style plays a significant role in socialization. Overall, the best child outcomes typically result from an **authoritative** parenting style. The influence of day care on development depends entirely on the quality of day care rather than the amount of time spent in day care. The influence of leisure activities, such as television and video games, depends on the time spent in the activity as well as the type of program or game being viewed or played.

Erikson observed three major developmental stages during childhood. **Autonomy** can be encouraged by an optimal balance of freedom and support. **Initiative**, the goal of the third stage, is marked by increased choices and self-directed behavior. **Industry** can develop in the elementary school years when children are encouraged to develop their skills and abilities and learn to respond effectively to both successes and failures. Optimal development at each stage increases the chances for mastery of each successive stage.

**Attention-deficit hyperactivity disorder (ADHD)** affects up to 7% of children, and some adults as well. It includes both behavioral and cognitive symptoms. Both nature and nurture play a role in development, and behavioral treatment can often be effective. Recently, some argue

that ADHD has positive characteristics that, properly harnessed, can be advantageous.

## What Changes Mark the Transition of Adolescence?

> ### Core Concept 7.3
>
> **Adolescence offers new developmental challenges growing out of physical changes, cognitive changes, and socioemotional pressures.**

Physically, **adolescence** begins with the onset of **puberty**. Psychologically, the meaning of adolescence varies culturally, as does the time at which adolescence is thought to end. In Western culture, the physical changes brought on by puberty often promote greater attention to physical appearance, and **body image** is linked to self-esteem. Sexuality and **sexual orientation** begin to develop during adolescence, with almost half of North American teens having their first sexual experience by age 17.

Cognitively, adolescence is characterized by Piaget's **formal operational stage**, during which increasing ability for abstract thought develops—if cultural educational norms support abstract thought. Moral thinking may also progress to higher levels, although moral thinking does not always lead to moral behavior, as evidenced by Bandura's work on **moral disengagement**. Risk taking increases during adolescence for Western teens, and although hormonal surges sometimes increase emotionality, most teens do not experience adolescence as a time of turmoil. From a neurological perspective, the brain undergoes another major pruning period in adolescence.

While the influence of peers takes on greater importance than in the childhood years, a stable relationship with parents is a crucial factor in the successful transition through adolescence. The primary developmental task of this period, according to Erikson, is the development of a unique **identity**. Psychologists have recently noted concerns regarding current societal influences on teens, including "the demise of guys" and the sexualization of girls.

College students appear to progress through some additional stages of cognitive development, according to researcher William Perry.

## What Developmental Challenges Do Adults Face?

> ### Core Concept 7.4
>
> **Nature and nurture continue to interact as we progress through a series of transitions in adulthood, with cultural norms about age combining with new technology to increase both the length and quality of life for many adults.**

*Adult development* is a relatively new field of study and is receiving increased attention by psychologists as more adults live longer and healthier lives. Rather than perceiving adulthood as a series of concrete and well-defined stages, research indicates that well-developed adults progress through a series of transitions throughout adulthood, each of which is marked by reflection on past years and growth into new directions.

According to Erikson, the major developmental task of *early adulthood* is the development of **intimacy**, characterized by a long-term commitment to an intimate partner. In previous generations, Westerners expected this to occur in a person's 20s, but in industrialized societies today, a transition period called **emerging adulthood** may precede intimacy and early adulthood. After the exploration and experimentation of emerging adulthood, most adults marry. Successful intimate relationships rely on effective communication and conflict resolution and on a 5:1 ratio of positive to negative interactions.

Contrary to popular belief, research indicates that midlife is a peak period of development in many respects. Middle adults' ability to integrate a variety of complex thinking skills facilitates a complex life that includes work, relationships, and healthy coping with stressful life events. Erikson saw the main developmental task of middle adulthood as **generativity**, which involves contributing to the next generation. Midlife crises are not experienced by most midlife adults, although those who have not resolved earlier developmental tasks successfully are more at risk for a midlife crisis.

Late adulthood, according to Erikson, is best navigated by the achievement of **ego-integrity** or the ability to accept both the successes and failures of one's past and present. Both cognitive and physical decline can—to some extent—be slowed significantly by regular physical and mental exercise. Moreover, some abilities, such as vocabulary and social skills, actually improve with age. Cultural norms also have an impact on aging and foster expectations of positive or negative changes along with it. Remaining active and engaged on all levels—physically, intellectually, and socially—is the most important key to healthy aging.

## Critical Thinking Applied: The Mozart Effect

The notion that playing classical music for babies before birth will subsequently increase their IQ score has become a popular belief. But a closer look at the research indicates that the claim is wildly exaggerated. The gain in IQ score disappeared after just 15 minutes, and further testing revealed that it was actually positive mood that temporarily increased cognitive functioning.

# Additional Video Resources

Here are four video resources we think you will find both interesting and of personal value to understanding aspects of development over the life span.

**WATCH** Interview with Twins Separated at Birth

Twin girls Elyse and Paula were given up for adoption at birth, and placed into two different homes—neither ever knowing she had a twin sister. In their 30s, they have been reunited and share some intriguing similarities. Watch the interview here: http://abavtooldev.pearsoncmg.com/sbx_videoplayer_v2/simpleviewer.php?projectID=MPL&clipID=twins.flv&ui=2.

**WATCH** Baby's Innate Number Sense Predicts Future Math Skill

Watch original footage from Ariel Starr's study at Duke University that examined how infants detected differences in numbers. You can view the video here: https://youtube/7uh8FkR_4OU

**WATCH** Kids' Minds Really Are Different!

For an engaging demonstration of children showing some of Piaget's concepts, watch this charming video and see if you can recognize these concepts in action. You should be able to identify centration, irreversibility, egocentrism, and theory of mind. Watch the video here: https://www.youtube.com/watch?v=wBHcLR_fiks

**WATCH** How Do We Know Some Language Abilities Are Innate?

Want to watch children in action as they learn new words, and see how it demonstrates the innate nature of language? Watch as Stephen Pinker works with young children to illustrate these principles in this video: https://www.youtube.com/watch?v=tdXJnb-AwXA.

# Chapter 8
# States of Consciousness



What does it mean to be conscious? How can we measure various states of consciousness?

## ⌄ Core Concepts

**8.1** The brain operates on many levels at once—both conscious and unconscious.

**8.2** Consciousness fluctuates in cycles that correspond to our biological rhythms and to patterns of stimulation in our environment.

**8.3** An altered state of consciousness occurs when some aspect of normal consciousness is modified by mental, behavioral, or chemical means.

HAVE YOU EVER HAD A DREAM YOU ENJOYED SO MUCH THAT YOU wanted to linger in bed so you could disappear back into it? On a hot June morning in Phoenix, a housewife and mother of three awoke from just that sort of dream.

> In my dream, two people were having an intense conversation in a meadow in the woods. One of these people was just your average girl. The other person was fantastically

beautiful, sparkly, and a vampire. They were discussing the difficulties inherent in the facts that (A) they were falling in love with each other while (B) the vampire was particularly attracted to the scent of her blood, and was having a difficult time restraining himself from killing her immediately (Meyer, 2011).

Captivated by the intensely handsome young man in the dream and intrigued by the personalities and the

dilemma of the couple, she began to write a story about them—a story that quickly developed into the blockbuster series of books and movies called *Twilight*.

Stephenie Meyer was not the first to be inspired by a dream. From ancient times, dreams have been regarded as sources of insight, creativity, and prophecy. We can see this, for example, in the Old Testament story of the Israelite Joseph, who interpreted Pharaoh's dreams of fat and lean cattle as predicting first the years of plenty and then the years of famine that lay in store for the Egyptian kingdom (Genesis 41:1–7).

In more modern times, English poet Samuel Taylor Coleridge attributed the imagery of his poem *"Kubla Khan"* to a dream (possibly drug-induced) that he experienced after reading a biography of the famed Mongol warrior. Likewise, artists such as surrealist Salvador Dali found dreams to be vivid sources of imagery. Composers as varied as Mozart, Beethoven, the Beatles, and Sting have all credited their dreams with inspiring certain works. In the scientific world, chemist August Kekule's discovery of the structure of the benzene molecule was sparked by his dream of a snake rolled into a loop, grasping its own tail tucked in its mouth. Even the famous horror writer Stephen King claims to have harvested story ideas from his own childhood nightmares.

- *Why do we dream?*
- *Do dreams help us solve problems?*
- *Do they reflect the workings of the unconscious mind?*
- *Or are dreams just random mental "junk"—debris left over from the previous day, perhaps?*

The difficulty in studying dreams scientifically is that these mental states are private experiences. No one else can experience your dreams directly. These issues, then, frame the problem on which we will focus in this chapter.

**CHAPTER PROBLEM:** **How can psychologists objectively examine the worlds of dreaming and other subjective mental states?**

Dreaming represents one of many states of consciousness possible for the human mind. Others include our familiar state of wakefulness and the less-familiar states of hypnosis, meditation, and the chemically altered states produced by psychoactive drugs—all of which we will study in this chapter. But that's not all. Behind these conscious states, much of the brain's work occurs offline—outside of awareness (Wallace & Fisher, 1999). This includes such mundane tasks as the retrieval of information from memory (What is seven times nine?), as well as the primitive operations occurring in the deep regions of the brain that control basic biological functions, such as blood pressure and body temperature. Somewhere between these extremes are parts of the mind that somehow deal with our once-conscious memories and gut-level responses, as varied as recollections of this morning's breakfast or your most

embarrassing moment. As we will see, the nature of this netherworld of nonconscious ideas, feelings, desires, and images has been controversial ever since Freud suggested that dreams may reflect unrecognized and unconscious fears and desires. In this chapter, we will evaluate this claim, as well as others made for hidden levels of processing in the mind. To do so, we begin with the familiar state of consciousness that fills most of our waking hours.

# Key Question: How Is Consciousness Related to Other Mental Processes?

**Core Concept 8.1**

**The brain operates on many levels at once—both conscious and unconscious.**

What does it mean to be conscious? Is it alertness? Is it awareness, perhaps of oneself and of one's environment? Both these suggestions seem reasonable. But consider this: Discovery of the chemical transmission between neurons (rather than electrical transmission, as previously thought) came to physiologist Otto Loewi in a dream, from which he awoke and scribbled down his idea on paper next to his bed. He went back to sleep, but in the morning found he couldn't decipher his handwriting and could not remember the design of the experiment he had dreamed of. Fortunately, he had the same dream the next night, and this time he got out of bed immediately, raced to his lab, and tried the experiment—which set the stage for his Nobel prize–winning contribution to medicine in 1936.

So here is the question: Was Loewi conscious when, in his sleep, he designed the revolutionary experiment? Although we generally assume that alertness is a prerequisite for clear thinking or problem solving—such as that which produced Loewi's idea—we don't typically think of sleeping or dreaming as a state of alertness, so we probably wouldn't say he was alert. Was he conscious when he wrote it down, only to find he could not read what he wrote the next morning? He was



Have you ever had an idea about something, or figured out how to solve a problem, in a dream? If you have, does that mean that we are conscious when we dream? This may be one of the most provocative questions in cognitive psychology.

aware enough to reach for a pen and paper, and we generally assume we must be conscious for such goal-directed behavior. But if he was conscious when he wrote it down, why couldn't he make sense of it the next day?

This puzzling example illustrates the difficulty psychologists sometimes have in defining exactly what it means to be conscious. The problem is that consciousness is so subjective and elusive—like searching for the end of the rainbow (Damasio, 1999, 2000). The conundrum first presented itself when **structuralists** attempted to dissect conscious experience more than a century ago. As you may recall, they used a simple technique called **introspection**, asking people to report on their own conscious experience. The slippery, subjective nature of consciousness quickly became obvious to nearly everyone, and psychologists began to despair that science would never find a way to study objectively something so private as conscious experience. (Think about it: How could you prove that you have consciousness?)

The problem seemed so intractable that, early in the 20th century, the notorious and influential behaviorist John Watson declared the mind out of bounds for the young science of psychology. Mental processes were little more than by-products of our actions, he said. In other words, for example, you don't cry because you are sad; you are sad because some event makes you cry. Under Watson's direction, psychology became simply the science of behavior. And so psychology not only lost its consciousness, but also lost its mind!

The psychology of consciousness remained in limbo until the 1960s, when a coalition of cognitive psychologists, neuroscientists, and computer scientists brought it back to life (Gardner, 1985). They did so for two reasons.

1. First, many psychological issues had surfaced that needed a better explanation than behaviorism could deliver: quirks of memory, perceptual illusions, and drug-induced states (which were very popular in the 1960s).

2. The second reason for the reemergence of consciousness came from technology. Scientists were acquiring new tools—especially computers, which made brain scans possible. Computers also provided a model that could explain how the brain processes information.

The combination of new tools and unsolved problems, then, led to a multidisciplinary effort that became known as **cognitive neuroscience**. Attracting scientists from a variety of fields, cognitive neuroscience set out to unravel the mystery of how the brain processes information and creates conscious experience. From the perspective of cognitive neuroscience, the brain acts like a biological computing device with vast resources—among them 100 billion transistor-like neurons, each with thousands of interconnections—capable of creating the complex universe of imagination and experience we think of as consciousness (Chalmers, 1995).

The big picture that emerges is one of a conscious mind that can take on a variety of roles, as we will see. But the conscious mind must focus sequentially, first on one thing and then another, like a moving spotlight (Tononi & Edelman, 1998). Consciousness is not good at multitasking; so, if you try to drive while texting on your cell phone, you must shift your attention back and forth between tasks (Rubenstein and others, 2001; Strayer and others, 2003). Meanwhile, **nonconscious processes** have no such restriction and can work on many jobs at the same time—which is why you can walk, chew gum, and breathe simultaneously. In more technical terms, consciousness must process information *serially*, while nonconscious brain circuits can process many streams of information *in parallel*. This big picture, then, leads us to our core concept:

| The brain operates on many levels at once—both conscious and unconscious.

Let's get back to the question we posed at the beginning of this section: What exactly is **consciousness**? Thanks to advances in cognitive neuroscience, we now define consciousness not as a state of being but as the brain *process* that creates our mental representation of the world and our current thoughts. Identifying it as a process acknowledges that consciousness is dynamic and continual rather than static and concrete. And it is a process with links to other processes we have studied, including memory, learning, sensation, and perception.

**Figure 8.1** Consciousness Is Linked to Many Brain Processes

Consciousness is linked to learning, memory, attention, and sensation and perception.

For example, everything entering consciousness passes through **working memory**. When sensory stimulation gains our attention and passes from sensory memory into working memory, we become conscious of it. Thus, we can also say we are conscious of everything that enters working memory. Therefore, some psychologists have suggested working memory is actually the long-sought seat of consciousness (Engle, 2002; LeDoux, 1996).

Consciousness is also linked to learning, although cognitive learning and behavioral learning seem to involve different brain mechanisms. Most *cognitive learning* (such as your learning of the material in this chapter) relies on conscious processes. On the other hand, much *behavioral learning*, particularly **classical conditioning**—such as the acquisition of a phobic response—relies heavily on processes that can occur outside of consciousness.

Another process linked to consciousness is **attention**, a feature that makes one item stand out among others in consciousness—as when someone calls your name in a crowded room. Attention also enables you to follow the thread of a conversation against a background of other voices. (Psychologists call this *selective attention* or the *cocktail party phenomenon*.) Attention, in turn, is closely related to the dual processes of **sensation** *and* **perception**, including pain perception—a mental process for which the link to consciousness is only partially known. Later in this chapter, we will explore how states of consciousness, such as hypnosis, may be effective in managing pain.

One last point about the role of consciousness is this: It helps you combine both reality and fantasy and creates a sort of ongoing "movie" in your head. For example, if you see a doughnut when you are hungry, working memory forms a conscious image of the doughnut (based on sensation and perception) and consults **long-term memory**, which—thanks to behavioral learning—associates the image with food and allows you to imagine eating it. In this way, consciousness relies on all the processes we have discussed. But exactly *how* the brain does this is perhaps psychology's greatest mystery. How do the patterns in the firing of billions of neurons become the conscious image of a doughnut—or of the words and ideas on this page?

By the end of this section, you will be able to:

**8.1**   Describe techniques used to study consciousness

**8.2**   Review different models used to gain perspectives of the conscious and the nonconscious minds

**8.3**   Describe what scientists know about the consciousness involved in coma and related states

# 8.1: Tools for Studying Consciousness

**Objective:**  **Describe techniques used to study consciousness**

High-tech tools, such as the **fMRI**, **PET**, and **EEG**, have opened new windows to the brain that enable researchers to see which regions are active during various mental tasks. In other words, we can identify some of the "what" of consciousness: Although these imaging devices do not, of course, reveal the actual contents of conscious experience, they do indicate distinct groups of brain structures that "light up," for example, when we read, speak, or shift our attention (see Figure 8.2).

**Figure 8.2**  PET Scans of the Brain at Work

These PET scans show how distinct regions of the brain become active during different conscious tasks.



The resulting images leave no doubt that conscious processing involves simultaneous activity in many brain circuits, especially in the cortex and pathways connecting the thalamus to the cortex. But, to glimpse the underlying mental processes—the "how" of consciousness—psychologists have devised other, even more ingenious, techniques. We will see many of these throughout this chapter and, in fact, throughout this text. For the moment, though, we will give you just two examples as previews of coming attractions.

## 8.1.1: Mental Rotation

A classic experiment by Roger Shepard and Jacqueline Metzler (1971) showed that, when people speak of "turning things over" in their minds, it's not merely a metaphor. Using drawings like those in Figure 8.3, Shepard and Metzler asked volunteers to decide whether the two images in each pair show the same object in different positions.

**Figure 8.3** The Mental Rotation Experiment

Do you think the two images in each pair show the same object in different positions? And is that question easier to answer for one of the three pairs?



**Show Answer**

Shepard and Metzler hypothesized that, if the mind actually rotates images when comparing them, people would take longer to respond when the difference between the angles of the paired images increased. And they were right. Did you figure out A faster than you did B or C?

## 8.1.2: Zooming in with the Mind

Another clever approach to the "how" of consciousness takes a different twist: Stephen Kosslyn found we can use our conscious minds to "zoom in," camera-like, on the details of our mental images. To demonstrate this, Kosslyn (1976) first asked people to think of objects, such as an elephant or a cat or a chair. Then he asked questions about details of the imagined object (for example, "Is it a black cat?" or "Does it have a long tail?"), recording how long it took for people to answer. He discovered that the smaller the detail he asked for, the longer subjects needed for a response. People required extra time, Kosslyn proposed, to make a closer examination of their mental images.

## Do It Yourself!
### Zooming In on Mental Images

Ask a friend to close his or her eyes and imagine a house. Then ask your friend to describe the color of the roof, the front door, and doorbell button. Using a watch or clock that displays seconds, record the amount of time it takes to get each answer. Based on Kosslyn's research, which item would you predict would require the longest response time? The shortest?

You will probably find that the smaller the detail you ask for, the longer it takes your friend to respond. Kosslyn interpreted this to mean that people need the extra time to "zoom in" on a mental image to resolve smaller features. In other words, we examine our mental images in the same way that we examine physical objects in the external world in order to perceive the "big picture" or the details.



Just as it takes longer for a photographer to zoom in on a small detail, it takes more time for us to zoom in on smaller details of our mental images.

Both these experiments suggest that we consciously manipulate our visual images. And we do so in much the same way that we might manipulate physical objects in the outside world (Kosslyn, 2005). As we progress through the chapter, you will learn about other techniques used by neuroscientists to study consciousness and its allied mental processes. First, though, let's look more closely at some models of the mind.

# 8.2: Models of the Conscious and Nonconscious Minds

**Objective:** Review different models used to gain perspectives of the conscious and the nonconscious minds

As psychologists have attempted to study and understand consciousness, several models have emerged that remain useful today. One strategy, useful in many types of problem-solving, is searching for analogies. Psychologists have employed a similar strategy in trying to capture the essence of consciousness by searching for the best metaphor to represent this elusive concept.

## 8.2.1: Freud's Levels of Consciousness

Sigmund Freud originally suggested a notion many of us take for granted today: that our minds operate on several levels at once. The metaphor he developed as a model for consciousness compared it to the tip of an iceberg, suggesting a much larger presence beneath the surface. Freud saw this larger presence—the **unconscious**—as a reservoir of needs, desires, wishes, and traumatic memories.

Moreover, he believed that processing in the unconscious—outside our awareness—could influence our conscious thoughts, feelings, dreams, fantasies, and actions. A large body of evidence now confirms Freud's insight that much of the mind lurks and works out of sight, beneath the level of awareness.

### Figure 8.4  Freud's Levels of Consciousness

Freud used an iceberg as a metaphor for the human mind, suggesting that the part of our mind we are aware of is minimal—like the tip of an iceberg.

**PERS 5 Freud's View of the Human Mind: The Mental Iceberg**



**THE PRECONSCIOUS**  Psychologists often use Freud's term, the **preconscious**, in referring to memories of events (your birthday last year, for example) and facts (Salem is the capital of Oregon) that are not immediately conscious but are readily accessible. These memories can cross over to consciousness with relative ease when something cues their recall. Otherwise, they lie in the background of the mind, just beyond the boundary of consciousness, until needed. Thus, the preconscious, in the modern cognitive sense, is much the same as **long-term memory**.

Preconscious processing offers both an advantage and a disadvantage:

- On one hand, it isn't restricted to the serial, one-thing-at-a-time limitation of consciousness. Thus, it can search for information in many places at once—an ability called **parallel processing**.
- On the other hand, the preconscious lacks the ability consciousness has for deliberate thinking. You might think of the preconscious as a memory storehouse, where the stock is constantly rotated so that the most recently used and most emotionally loaded information is most easily accessed.

**THE UNCONSCIOUS**  A dictionary might define the term unconscious as the absence of all consciousness, as in one who has fainted, become comatose, or is under anesthesia. Freud, however, defined the unconscious as a reservoir of primitive motives and threatening memories hidden from awareness. And cognitive psychologists have still another meaning for *unconscious* that refers to any sort of nonconscious process (including breathing, turning your head, etc.) produced in the brain. Pulling these notions together, we will define the **unconscious** as a broad term that refers to many levels of processing below the level of awareness. These can range from preconscious memory, to brain activity that controls basic body functions, to the processes that operate in the background when we form a perception, say, of a table or a comment made by a friend. Such unconscious processes can be subtle—perhaps leading, without our realization, to anxiety or depression (Kihlstrom, 1987).

You can get some idea of how unconscious processes can affect us if you think about how you often follow a familiar route to work or school without apparent thought—even when you are driving! Unconscious processing can also be studied in the laboratory, as you will see in the following demonstration. Try filling in the blanks to make a word from the following stem:

$$D E F \text{———}$$

**Seeing this blank, which word immediately came to your mind?**

Using a technique called *priming*, psychologists can influence the answers people give to such problems—without their being conscious that they were influenced. In the example just given, there are a number of possible ways to complete the word stem, including *defend*, *defeat*, *defect*, *defile*, *deform*, *defray*, and *defuse*. We don't know for sure what your answer was, but we did set you up to think of the word *define*. How? We deliberately "primed" your response by using the word *define* several times in the previous paragraph. (There is no certainty, of course, that you would respond as predicted—merely an increased probability.) With methods such as this, psychologists have a powerful tool for probing the interaction of conscious and unconscious processes.

## 8.2.2:  James's Stream of Consciousness

William James offered a different metaphor for consciousness, likening ordinary waking consciousness to a flowing stream carrying ever-changing sensations, perceptions, thoughts, memories, feelings, motives, and desires. This "stream of consciousness" includes awareness of ourselves and of stimulation from our environment. According to James, it can also include physical sensations from within, such as hunger, thirst, pain, and pleasure.

Part of James's theory was somewhat similar to Freud's distinction between the conscious and the preconscious. For James, consciousness had two levels:

1. An area of focus, which included whatever we are attending closely to at any given time
2. A peripheral consciousness encompassing the feelings and associations that give meaning and context to our focus

So, for example, when you attend the wedding of a friend, your focus is on the couple getting married and the guests with whom you are interacting. The feelings you have about the marriage, all the things you know about what led the couple to this pivotal moment in their lives, and whatever other memories the event triggers for you are all part of the peripheral conscious, like the supporting actors in a drama. In this way, we might use vision as another metaphor to describe James's model of consciousness: Like our peripheral vision, our peripheral consciousness is not the subject of our focus, but lends meaning and context to it.



James theorized two levels of consciousness. The focus of consciousness, like what's inside the spotlight, takes center stage. Equally important, however, is our peripheral consciousness: Like what lies outside the spotlight, our peripheral consciousness adds rich detail.to experience.

## 8.2.3:  The Modern Cognitive Perspective

The final metaphor we offer for consciousness comes from cognitive psychology. The *computer metaphor* likens consciousness to the information and images that appear on a computer screen, while nonconscious processes are like the electronic activity behind the scenes, deep inside the computer. Most of the time, our nonconscious machinery quietly operates in parallel with consciousness, but occasionally a nonconscious motive or emotion becomes so strong it erupts into consciousness—as when a peculiar odor associated with an emotional memory suddenly brings that emotion to the forefront, or when a growing hunger drive bursts into awareness.

All these metaphors can help us grasp the nature of consciousness, and we will return to them periodically throughout the chapter as we develop our understanding of this fascinating process. Before leaving this section, though, let's ask one more important question: Why is consciousness important?

## 8.2.4:  What Does Consciousness Do for Us?

At this moment, your consciousness is focused on these words, written in black letters on a white background. But the words don't stand alone. Like James suggested in his discussion of peripheral consciousness, the words also have meaning, which flows through consciousness as you read. You can, of course, shift the spotlight of your attention to something else—music in the background, perhaps—and, as you do so, the words on the page slip into the fringes of awareness. You may be moving your eyes across the page, but the meaning does not really register. (Every student has had this experience.)

Now, if we can have your attention again, we'd like to remind you that consciousness has many functions. Three especially important ones were illustrated by the scenario in the previous paragraph (Solso, 2001; Tononi & Edelman, 1998):

- **Consciousness restricts our attention.** Because consciousness processes information serially, it limits what you notice and think about. In this way, consciousness keeps your brain from being overwhelmed by stimulation. Unfortunately, the one-thing-at-a-time property of consciousness will not let you concentrate on what you are reading when you shift your attention to music playing in the background or to a new text message It also explains why using your cell phone while driving drastically increases your risk of a crash.

- **Consciousness provides a mental "meeting place,"** where sensation can *combine* with memory, emotions, motives, and a host of other psychological processes in the process we have called **perception**. Consciousness, then, is the canvas on which we customarily create a meaningful picture from the palette of stimulation offered by our internal and external worlds. This is the aspect of consciousness that links meaning to words on a page or connects the emotion of joy to the sight of an old friend's face. Indeed, neuroimaging research indicates that the essence of consciousness is to make linkages among different parts of the brain (Massimini and others, 2005). Consciousness, therefore, lies at the very heart of cognition.

- **Consciousness allows us to create a mental model of the world**—a model we can *manipulate* in our minds. Unlike simpler organisms, consciousness frees us from being prisoners of the moment: We don't just react reflexively to stimulation. Instead, we use a conscious model of our world that draws on memory and forethought, bringing both the past and the future into awareness. With this model, we can think and plan by manipulating our mental world to evaluate alternative responses and imagine how effective they will be. It is this feature of consciousness that, for example, helps you make associations between concepts in this text and your own experiences, or keeps you from being brutally honest with a friend wearing clothes you don't like.

These three features—*restriction, combination,* and *manipulation*—apply in varying degrees to all states of consciousness, whether dreaming, hypnosis, meditation, a drug-induced state, or our "normal" waking state. But what about the condition known as a coma: Where does it fit into our study of consciousness?

## 8.3: Coma and Related States

**Objective:** Describe what scientists know about the consciousness involved in coma and related states

The general public profoundly misunderstands what it means to be in a **coma**. This misunderstanding stems, in part, from a few highly publicized and emotional cases that provoked heated discussion about the ethics of discontinuing life support in severely brain-injured patients (Meyers, 2007). The flames are fanned, too, by reports of "miraculous" recoveries. So what are the facts?

### 8.3.1: What Is a Coma?

Comas are not stable, long-term states. Rather, they usually last only a few days or a few weeks after brain injury. In a comatose state, patients lack the normal cycles of sleep and wakefulness, their eyes usually remain closed, and they cannot be aroused. Those who improve transition to a *minimally conscious state,* during which they may have limited awareness and a functioning brain. Recovery is usually gradual (National Institute of Neurological Disorders and Stroke, 2007). Those who do not improve deteriorate into a *persistent vegetative state.* In this condition, they may open their eyes periodically, and they pass in and out of normal sleep cycles, but they have only minimal brain activity and basic reflexes. Chances for full recovery from a persistent vegetative state are slim.

But diagnosis of a persistent vegetative state is sometimes inaccurate, as the measurement of brain activity is not a perfect science. And such a mistake could potentially be fatal when the diagnosis is used to make decisions about whether or not to continue life support. Promising new brain imaging techniques are being discovered, however, that can more accurately identify the level of brain activity and awareness in patients who appear to be in persistent vegetative states. Advances in PET and MRI technology have recently enabled researchers to predict successfully which patients in persistent vegetative state would improve and transition into minimally conscious states (Owen and others, 2009).



New research suggests people in vegetative states may be able to perceive outside stimuli, such as hearing loved ones' voices. Thus, these states of consciousness may be analogous to being trapped behind an opaque glass. New findings offer promise for breaking through the barrier to consciousness.

### 8.3.2: Can People in a Coma Hear Your Voice?

Even more exciting is a new study citing clear evidence that patients in a coma—or even in a persistent vegetative state—are more likely to recover if their loved ones talk to them. Theresa Pape, a neuroscientist at Chicago's Northwestern University, recently conducted a randomized, placebo-controlled study of patients in persistent vegetative states and minimally conscious states, beginning about 2 months after their brain injury. Family and friends recorded familiar stories from the patients' lives, and scientists played the stories to the patients four times a day for 6 weeks through headphones. Using MRI scans, researchers saw increased activity in areas of the patients' brains associated with long-term memory and language processing when they heard their loved ones voices telling the stories and calling them by name. And the results happened quickly—most of the effects occurred in the first 2 weeks of the study, indicating that the treatment stimulated brain activity that helped the patients regain a higher level of consciousness (Pape and others, 2015). In

just a few weeks, they began waking more quickly, becoming more aware of their environment, and were even able to begin responding to conversations and directions. Pape suggests that the treatment can be effective with stroke victims as well as traumatic brain injury patients, and recommends families work with the medical team to use this treatment to augment other forms of treatment the patient is receiving.

## Psychology Matters

## Using Psychology to Learn Psychology

Want to expand your consciousness? In the strictest sense, it is not really possible, because consciousness has a limited capacity. As we have noted, consciousness can focus on only one thing at a time. What can be expanded, however, is the access your consciousness has to information stored in your preconscious memory. Learning how to do that can be of tremendous help to students who need to absorb a large amount of information and to prove it on an exam.

You will, of course, have an advantage if you face an exam with your consciousness unimpaired by the massive sleep debt students sometimes incur in an "all-nighter" study session. No amount of caffeine can bring your sleep-deprived consciousness back to optimum functioning. Just as your teachers have always preached—and as memory research demonstrates—it is far better to spread your studying over several days or weeks than to try to learn everything at once. So there is your first tip for increasing your access to your preconscious!

Because of its severely limited capacity, you cannot possibly hold in consciousness everything you need to remember for an exam. The material must be stored, readily accessible but outside of consciousness, in preconscious long-term memory. The trick is to be able to bring it back into consciousness when needed. Here are some more strategies to help:

1. **Practice elaborative rehearsal.** Students sometimes think their professors ask "trick questions," although professors almost never do so intentionally. In reality, a good exam question will show whether students understand the meaning of a term rather than having merely memorized a



Talking about concepts with a study partner or study group helps increase your conscious understanding of the material.

definition. By putting the definition into your own words, and then coming up with an example of it from your own life, you will create a richer memory for the concept, thus making it easier to retrieve from your preconscious mind.

2. **Look for connections among concepts.** Once you understand the concepts, you also need to know how those concepts relate to each other. The professor may ask you to explain, for example, the relationship between *consciousness* and *preconsciousness*. Therefore, a good study strategy is to ask yourself how a new concept (e.g., *preconscious*) is related to other concepts learned previously (e.g., *conscious* or *unconscious*).

3. **Anticipate the most likely cues.** Just because you "know" the material doesn't mean the exam questions will automatically prompt the release of the information from long-term memory back into consciousness. It pays, therefore, to spend some of your study time thinking about the kinds of questions your professor might ask. For example, you will learn in this chapter about the effects of various psychoactive drugs, but you could be stumped if the professor asks you to explain why alcohol is more like barbiturates than opiates. You can often anticipate such questions by noting what the professor emphasizes in lecture. It also helps to think of the kinds of questions that your professor is known to favor. (A study partner helps a lot with this.) Some of the most common essay questions begin with terms such as "Explain," "Evaluate," or "Compare and contrast."

In general, the relationship between consciousness and memory suggests that to learn the kind of material required in your college classes, you must actively process the material while it is in your consciousness. To do so effectively, you must make the material meaningful. This requires understanding it in your own words, with your own examples—thus making connections between new information and old information already in your memory. It also requires organizing information so you see how it is interconnected, and anticipating the cues that will be used to bring it back to consciousness. The more frequently you practice these strategies for remembering, the more quickly the material can be brought into your consciousness during the next exam.

# Key Question: What Cycles Occur in Everyday Consciousness?

**Core Concept 8.2**

**Consciousness fluctuates in cycles that correspond to our biological rhythms and to patterns of stimulation in our environment.**

If you are a "morning person," you are probably at your peak of alertness soon after you awaken. But this mental state doesn't last all day. Like most other people, you

likely experience a period of mental lethargy in the afternoon—at which point you may join much of the Latin world and wisely take a siesta. Later, your alertness increases for a time, only to fade again during the evening hours. Punctuating this cycle may be periods of heightened focus and attention and periods of reverie, known as daydreams. Finally, whether you are a "morning" or "night" person, you eventually drift into that third of your life in which conscious contact with the outside world nearly ceases: sleep.

Psychologists have traced these cyclic changes in consciousness, looking for reliable patterns. The core concept for this section summarizes what they have found:

> Consciousness fluctuates in cycles that correspond to our biological rhythms and to patterns of stimulation in our environment.

In this section, we focus primarily on the cyclic changes in consciousness involved in sleep and nocturnal dreaming. We begin, however, with another sort of "dreaming" that occurs while we are awake.

By the end of this section, you will be able to:

**8.4**   **Describe the frequency and value of daydreaming.**

**8.5**   **Evaluate the biology of sleep**

**8.6**   **Evaluate the content, real-life relevance, causes, physiology, and functions of dreams**

# 8.4:  Daydreaming

**Objective:**   **Describe the frequency and value of daydreaming.**

In the mildly altered state of consciousness we call **daydreaming**, attention turns inward to memories, expectations, and desires—often with vivid mental imagery (Roche & McConkey, 1990). Daydreaming occurs most often when people are alone, relaxed, engaged in a boring or routine task, or just about to fall asleep (Singer, 1966, 1975). But is daydreaming normal? You may be relieved to know that most people daydream every day. In fact, it is abnormal if you do not! On average, about 30% of our waking hours is spent daydreaming, with young adults reporting the most frequent and vivid daydreams. Both the incidence and the intensity of daydreams appear to decline significantly with increasing age (Giambra, 2000; Singer & McCraven, 1961).

## 8.4.1:  Why Do We Daydream?

A brain scan study by Malia Mason and her colleagues (2007) suggests that daydreaming may be inevitable. Here's why: When our brain is in a restful state, and not focused on an external task, an area dubbed the "brain default network" takes over. A complex web of regions concentrated in the temporal and frontal lobes, this "default" activity is seen as an ongoing, continuous stream of processing that focuses inward, paying special attention to how our experiences are relevant to our own lives in the present, as well as in the past and the future. Evolutionary psychologists think this default network is probably adaptive, in that it maintains some sense of awareness of what's important, even when we aren't paying attention. Activity in this network appears to be highest when people are daydreaming about future events, reminiscing about their past, or imagining how someone is feeling or thinking (Buckner and others, 2008). Thus, the brain seems wired to remain active, even at rest—a finding that will help us understand our nighttime dreams a little later in this section.

## 8.4.2:  Is Daydreaming Helpful or Harmful?

Daydreams can serve valuable, healthy functions (Klinger, 1987). They often dwell on practical and current concerns in our lives, such as classes, goals (trivial or significant), and interpersonal relationships. As we ruminate on these concerns, daydreaming can help us make plans and solve problems: For some people, this kind of daydreaming increases the chances of reaching their goals (Langens, 2003). Daydreams can also be a source of creative insight, rather like flashes of **intuition**. When faced with a difficult problem, occasional periods of mind-wandering can give our brains access to unconscious associations and possibilities that may provide that "Aha!" moment that reveals the perfect solution (Schooler and others, 1995).



Daydreaming is a normal human activity that can help with creativity and problem solving. Research shows we are happiest when fully engaged in a task, though, so the timing of daydreaming influences whether it is healthy for you or not.

Be careful about the timing of your daydreaming, though. New research indicates that daydreaming can interfere with memories of recently learned material. And the more distant the daydream from reality, the greater the effect: Students who daydreamed about an international vacation forgot more about what they'd recently learned

than students who dreamed about a local vacation (Delaney and others, 2010). This suggests that if you slip into daydreaming during an important study session, you risk forgetting some of what you just learned.

And we must include one more caution about daydreaming. Research coming out of the Harvard laboratory of Matthew Killingsworth and Dan Gilbert (2010) threatens one of our most common assumptions about daydreaming—the notion that daydreaming is a happy pursuit.

A study of more than 2,000 adults of all ages used a specially created iPhone app to check in with participants at random times of the day. When their app chimed, participants answered a few quick questions about what they were doing, whether they were focused on it or not, and how happy they were.

**Findings revealed something that might surprise you. When do you think people were happiest?**

People were happiest when they were fully immersed and focused on a task—*not* when they were daydreaming. So, despite the fact that a wandering mind may be part of our brain's wiring system, it appears that an engaged mind is a happier mind.

How do daydreams compare with dreams of the night? No matter how realistic our fantasies may be, daydreams are rarely as vivid as our most colorful night dreams. Neither are they as mysterious—because they are more under our control. Nor do they occur, like night dreams, under the influence of biological cycles and the strange world that we call sleep. It is to this nighttime world that we now turn our attention.

# 8.5:  Sleep: The Mysterious Third of Our Lives

**Objective:**  Evaluate the biology of sleep

If you live to be 90, you will have slept for nearly 30 years. But what is this mysterious mental state? Once the province of psychoanalysts, prophets, poets, and painters, the world of sleep is now a vibrant field of scientific study revealing that sleep is one of our natural biological cycles (Beardsley, 1996). We begin our exploration of this realm of altered consciousness with an examination of these cycles.

## 8.5.1:  Circadian Rhythms

All creatures are influenced by nature's cyclic changes, especially the daily pattern of light and darkness. Among the most important for us humans are those known as **circadian rhythms**, bodily patterns that repeat approximately every 24 hours. (Circadian comes from the Latin *circa* for "about" and *dies* for "a day.") Internal control of these recurring rhythms resides in our **hypothalamus**, where our "biological clock"

sets the cadence of such functions as metabolism, heart rate, body temperature, and hormonal activity (Pinel, 2005). A group of cells in the hypothalamus known as the **suprachiasmatic nucleus (SCN)** receives input from the eyes, so it is especially sensitive to the light–dark cycles of day and night (Barinaga, 2002). From a biological perspective, then, the cycle of sleep and wakefulness is just another circadian rhythm.

For most of us, the normal sleep–wakefulness pattern is naturally a bit longer than a day. When living for long periods in environments with no time cues, most people settle into a circadian cycle closer to 25 hours. In a 24-hour world, however, our pattern becomes trained to readjust itself each day by our exposure to light and our habitual routines (Dement & Vaughan, 1999).

**CIRCADIAN RHYTHMS IMPACT TRAVELERS—AND EVERYONE ELSE**   The slightly-longer-than-24-hour time span of our natural circadian cycle sheds light on the condition know as jet lag, with its symptoms of fatigue, irresistible sleepiness, and temporary cognitive deficits. When we fly from east to west, our bodies adapt fairly easily to the longer day in the new locale, since the lengthening of the day matches up with our natural tendency for a longer cycle. Arriving in Seattle from New York, for example, at 7 P.M., your body on New York time thinks it is 10 P.M. In this situation, most people can stay up a little later to fit in with the new time zone and awaken the next morning at an appropriate local time without taking a circadian-rhythm hit. Flying eastward is a different story, though, because you lose hours. Your 7 A.M. wake-up call—when your body thinks it is 4 A.M.—will likely be a rude awakening, and you will have trouble being functional. The loss of hours in your circadian cycle, then, creates greater jet lag than a gain—and for each hour lost, it can take your body about a day to recover. For this reason, experts recommend a variety of strategies to help yourself start adjusting to the new local time a few days before actually arriving. The following box offers tips for managing jet lag.

## Tips for Managing Jet Lag and Other Circadian Shifts

Each year, more people travel long distances on airplanes—both for business and for pleasure. And while cramped airline seats take their toll on all passengers, travelers flying across multiple time zones (especially from east to west) also suffer the effects of a condition known as jet lag, characterized by headaches, fatigue, difficulty concentrating, insomnia, and even mild depression. As a general rule, it takes the body about a day to adjust its clock for every time zone you cross—so if you cross 7 to 10 time zones without managing your jet leg effectively, you risk getting your body caught up just in time to come home! Needless to say, that can interfere with the fun of a long-awaited vacation, or the productivity of an important business trip. Fortunately, a basic understanding of circadian

rhythms—and how jet lag impacts them—can also provide tips on how to reduce or even eliminate jet leg.

1. Adjust your bedtime and wake-up time to get yourself closer to the time zone of your destination. Do it in half-hour to 1-hour increments, day by day, for several days prior to departure. So, if your destination time zone is ahead of your home zone, get up and go to bed earlier and earlier; conversely, if your destination is behind your home zone, stay up and sleep a little later each day. This starts to reset your body clock so the time difference won't be as extreme when you arrive.

2. As soon as you check in for your flight, reset your watch or electronic clock and devices to match the time at your destination, and start "living" as though that was the correct time. Once your flight takes off, stay awake until the time you expect to go to bed at your destination, then try to sleep. Wear comfortable clothing, and bring a blanket or coat to keep warm, which will help you get drowsy. Many travelers use a sleep mask to block out light on the plane, further helping trick your brain into thinking it is nighttime.

3. To help sleep on the plane, eat a light but healthy meal. Remember that, when you sleep, you become dehydrated, and airline travel further dehydrates you. So, drink water or juice with your meal, and keep a bottle of water with you to sip from throughout your "night" of sleep. Avoid alcoholic beverages and salty foods, which also promote dehydration. You probably won't sleep soundly for hours on end on the plane, but even light sleep will help you rest.

4. Once you arrive at your destination, keep yourself on the local schedule. If you arrive in the daytime, resist the urge to take a nap. One of most important things you can do to overcome jet lag is to stay busy throughout the day, even if you are tired—that way, you have a much better chance of sleeping through that first night. Stay outside in the bright, natural light, which will signal your brain that it is daytime and help keep you awake. Take a walk, and avoid heavy meals or alcoholic beverages that could make you drowsy. Then, go to bed at a reasonable time in your new environment and, chances are, you'll wake up the next morning refreshed and ready for a great time!

Even people who don't routinely jet around the world experience the effects of similar circadian shifts—often every week. Most of us tend to stay up later at night on weekends, when we don't have to get up for school or work the next morning. But research indicates that, for every hour you stay up later on the weekend, thus sleeping later the next morning, you are shifting your circadian rhythm forward in a manner that feels natural to our bodies. When Monday morning rolls around, then, and your alarm rings to wake you up, the surprise to your circadian cycle causes a condition known as the "Monday morning blues."

**IS IT NATURAL TO SLEEP THROUGH THE NIGHT?** You may think of sleep as a process that occurs in an approximately 8-hour period, from the time you go to bed until your alarm wakes you in the morning. But that pattern is rather new in human history and limited mainly to people in industrialized countries. The "natural" human tendency is to sleep in a more fluid pattern, whenever one feels like it, in shorter periods during the day or longer stretches during the night (Bosveld, 2007; Warren, 2007). In rural villages throughout the world, sleepers will often wake up for an hour or two in the middle of the night and talk, play, have sex, or tend the fire—showing us just how malleable our sleep–wakefulness schedules can be.

Yet anything that cuts your sleep short or throws your internal clock off its biological schedule can affect how you feel and behave. Work schedules that shift from day to night are notorious for such effects (Dement & Vaughan, 1999; Moore-Ede, 1993)—although, like jet lag, symptoms are worse when shifts move backward in time than forward. And effects can be drastic:

> One study found that nurses with rotating shifts were twice as likely as those with regular shifts to fall asleep while driving to or from work, with double the risk of accident or error related to sleepiness on the job (Gold and others, 1992).

Staying up all night studying for an exam will have similar consequences.



Almost one-third of workers in America report having fallen asleep on the job at least once in the past month, according to the National Sleep Foundation. Among shift workers—who, among other things, work in hospitals and air traffic control—that figure rises to over 50%.

## 8.5.2: The Main Events of Sleep

Sleep was a mystery for most of human history—until late one night in 1952, when graduate student Eugene Aserinsky decided to record his sleeping son's brain waves and muscle movements of the eyes (Brown, 2003). The session proceeded uneventfully for about an hour and a half, with

nothing but the slow rhythms of sleep appearing as tracks on the EEG. Then, suddenly, a flurry of eye movements appeared. The recording showed the boy's eyeballs darting back and forth as though he were watching a fast-changing scene. At the same time, brain wave patterns showed the boy was alert. Expecting to find his son awake and looking around, Aserinsky entered the bedroom and was surprised to see him fast asleep, lying quietly with his eyes closed. Intrigued, the researcher ran more volunteers through the same procedure and found similar patterns in all of them.

About every 90 minutes during sleep, we enter the state Aserinsky discovered. What we now call **REM sleep** is marked by fast brain waves and rapid eye movements (REM) beneath closed eyelids, lasting several minutes or longer and then abruptly ceasing (Aserinsky & Kleitman, 1953). The interim periods, without rapid eye movements, are known as **non-REM (NREM) sleep**.

What happens in the mind and brain during these two different phases of sleep? To find out, researchers awakened sleepers during either REM sleep or NREM sleep and asked them to describe their mental activity (Dement & Kleitman, 1957; McNamara and others, 2005). The NREM reports typically contained either brief descriptions of ordinary daily events or no mental activity at all. By contrast, REM reports were filled with vivid cognitions, featuring fanciful, bizarre scenes, often of an aggressive nature. In other words, rapid eye movements were a sign of dreaming.

Strangely, while the eyes dance during REM sleep, voluntary muscles in the rest of the body remain immobile, in a condition known as **sleep paralysis**. From an evolutionary perspective, this probably kept our ancestors from wandering out of their caves and into trouble while acting out their dreams. (In case you're wondering: Sleepwalking and sleep talking don't occur during REM sleep, but rather in the deeper stages of NREM sleep.) We'll have much more to say about dreaming in a moment. For now, let's see how REM sleep fits with the other phases of sleep.

## 8.5.3: The Sleep Cycle

Imagine you are a volunteer subject in a laboratory sleep experiment. Connected to EEG recording equipment, you get comfortable with the wires linking your body to the machinery and settle in for a night's snooze. How will your brain waves change as you progress through the cycles of sleep? A close look at the recording of this cycle the next morning will show several distinct stages (see Figure 8.5), each with a characteristic EEG signature.

Over the course of an average night's sleep, most people travel through the stages of sleep four to six times. In each successive cycle, the amount of time spent in deep

**Figure 8.5** EEG Patterns in Stages of Sleep



Next time, why can't we just spring forward an hour on a Friday afternoon instead?

**Figure 8.6** Stages of Sleep

In a typical night, the deepest sleep (Stages 3 and 4) occurs mainly in the first few hours. As the night progresses, the sleeper spends less time in Stages 3 and 4 and more time in REM.



sleep (Stages 3 and 4) decreases, and the amount of time spent in REM sleep increases—so we may get up to an hour of REM at the end of a full sleep session. A look at Figure 8.6 will show you how this pattern plays out through a typical night's sleep.

---

**WRITING PROMPT**

**What Kind of Sleep Are You Getting?**

After reviewing the information in Figure 8.6, consider your own sleep patterns. Based on the average amount of sleep you get each night, about how much deep sleep are you getting? About how much REM? How do your answers compare to the average sleep need of about 8½ hours/night?

▶ | The response entered here will appear in the performance dashboard and can be viewed by your instructor.

**Submit**

Please note the three most important features of normal sleep:

(a) The 90-minute cycles

(b) The occurrence of deepest sleep near the beginning of the night

(c) The increase in REM duration as sleep progresses

**What would happen if a person were deprived of REM for a whole night? What do you think?**

Laboratory studies have investigated REM deprivation by waking sleepers up each time they slip into REM. The next day, the REM-deprived sleepers exhibit increased levels of tiredness and irritability. Then, during the following night, they typically spend much more time in REM sleep than usual, a condition known as **REM rebound**. This observation suggests that REM sleep satisfies some kind of biological need. Sleep-deprived college students take note: Because

we get most of our REM sleep during the last few cycles of the night, we inevitably suffer some REM deprivation and REM rebound if we don't get a full night's sleep.

## 8.5.4: Why Do We Sleep?

Sleep is so common among animals that it surely must have some essential function, but sleep scientists offer several possibilities (Maquet, 2001; Rechtschaffen, 1998). Evolutionary psychology suggests sleep may have evolved to enable animals to conserve energy and stay out of harm's way at times when there was no need to forage for food or search for mates (Dement & Vaughan, 1999; Miller, 2007). These functions, then, are coordinated by the brain's circadian clock.

Another function of sleep was poetically described centuries ago by William Shakespeare, when he spoke of "sleep that knits up the ravelled sleave of care." Thus, he speculated, sleep may have a restorative function for the body and mind. Studies now indicate that is indeed true: In Stages 3 and 4, during our deepest sleep, damaged cells in the body and brain are repaired and growth hormones are released, making these stages a key time for immune system restoration as well as regeneration and strengthening of muscles and tissues damaged by daily wear and tear. REM sleep may help the brain flush out the day's accumulation of unwanted and useless information—much like emptying your trash can (Crick & Mitchison, 1983). Experiments also show that REM improves cognitive functioning, particularly memory, creativity, and problem solving (Wagner and others, 2004). Sleep deprivation, then, inhibits these processes (Siegel, 2003; Winerman, 2006b). While progress has been made in learning how sleep actually restores us, a complete picture still eludes sleep scientists (Winerman, 2006b).

**Figure 8.7**  Patterns of Human Sleep Over a Lifetime



## 8.5.5:  The Need for Sleep

From a developmental perspective, our sleep patterns change throughout our lifetime (refer to Figure 8.7).

While our human physiology and circadian rhythms dictate our average sleep needs, keep in mind that individual needs can vary (Barinaga, 1997; Haimov & Lavie, 1996). Exercise, for example, influences our sleep needs: We spend more time in deep, Stage 4 sleep when we include strenuous physical activity in our daily routine (Horne, 1988).

---

**WRITING PROMPT**

**Analyzing Age-Related Changes in Sleep**

Study Figure 8.8, then consider these questions:

1.  Why do you think children sleep so much between birth and age 3?
2.  Why do you think the average number of hours of sleep continues to decline throughout the life span?

▶   The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

---

## 8.5.6:  Sleep Debt Wreaks Havoc

Your mother was right: Most adults need to sleep about 8 hours, or a bit more, to feel good and function efficiently. In the sleep laboratory, when volunteers are placed in a dark room and allowed to sleep without interruption and without reference to clocks, the average adult settles into a pattern that produces about 8½ hours of sleep each night. Yet most Americans get significantly less—night after night (Greer, 2004b; Maas, 1999). This creates a sleep shortage researcher William Dement calls a **sleep debt** (Dement & Vaughan, 1999).

People who pile up a chronic sleep debt usually don't realize it (Dement, 2000; Dement & Vaughan, 1999). They may be groggy when the alarm clock rouses them in the morning but fail to recognize it as a sign of a sleep debt because their circadian clocks nudge them into wakefulness over the next few hours. Afternoon drowsiness may be attributed to a big lunch—which, in truth, does not cause sleepiness. (It's the internal clock again.) They may also rationalize their struggle to stay awake in a meeting or class by telling themselves sleepiness is a normal response to boredom (Van Dongen and others, 2003). But, in fact, the normal response to boredom is restlessness, not sleepiness—unless one is sleep deprived.

Due to our circadian rhythms, your body clocks can trick you into feeling relatively alert at certain times of the day, prompting regularly scheduled cycles of wakefulness, even when you have not had enough sleep. But with a chronic sleep debt, you are never as alert and mentally efficient as you could be if the sleep debt were paid with a few good nights of sleep (Van Dongen and others, 2003). And it can affect your very life: Sleep deprivation is associated with weight gain, and also with a shortened life span (National Institute of Medicine, 2006). In addition, the sleep debt is sometimes "paid" with a tragedy—as in the 2010 crash of an airliner in India. All 158 people on board were killed when the pilot—who had fallen asleep at the controls for almost 2 hours and was too groggy to make sound judgments when he

---

**WATCH**  The Dangers of Drowsy Driving

Driving while you are sleepy accounts for more than 5,000 deaths each year. Watch this video to learn more: https://www.youtube.com/watch?v=yqXiiqYwyog

awoke just before landing—overshot the runway and the plane exploded into a ball of fire (Athrady, 2010).

Of special interest to students is this fact: Sleep deprivation has devastating effects on cognitive and motor functioning (Pilcher & Walters, 1997). According to William Dement, it "makes you stupid" (Dement & Vaughan, 1999, p. 231). Just how "stupid" was shown in a study that deprived one group of volunteers of sleep and gave another group enough alcohol to make them legally drunk (their blood alcohol content reached 0.1%). After being awake for 24 hours—like staying up all night studying for a test—the sleepy volunteers performed no better than the intoxicated group on tests of thinking and coordination (Fletcher and others, 2003). What effects do you suppose chronic sleep deprivation, so common during medical internships and residencies, has on physician performance?[1]

Find out whether you are getting enough sleep by answering the questions in the accompanying *Do It Yourself!* box.

How can you tell if you need more sleep? Answer the following questions honestly:

1. Do you often feel sleepy in your classes?
2. Do you sleep late on weekends?
3. Do you usually get sleepy when you get bored?
4. Do you often fall asleep while reading or watching TV?
5. Do you usually fall asleep within 5 minutes of going to bed?
6. Do you awake in the morning feeling that you are not rested?
7. Would you oversleep if you did not use an alarm clock to drive you out of bed?

**What was your answer to these questions—Yes or No?**

If you answered "Yes" to any of these questions, chances are that you are shorting yourself on sleep. You may also be paying the price in the quality of your learning and in your grades. And you may be putting your life in danger if you drive.

## Do It Yourself!
## How Much Sleep Do You Need?

Many college students operate in a chronic state of sleep deprivation. Because their schedules are crowded with study, work, and social events, students may convince themselves that they need only a few hours sleep each night. And, in fact, the average college student sleeps only about 6.8 hours a night (Hicks, 1990).

**Does too little sleep really make a difference in how well you perform in your classes? What do you think?**

Psychologist Cheryl Spinweber (1990) has found that sleep-deprived undergraduates get lower grades than their counterparts who get enough sleep. Recent studies also suggest that sleep deprivation contributes to weight gain: People who sleep less than 7 hours a night have high rates of obesity (Harder, 2006).

If you've ever fallen asleep in class, it may not have been due to a boring lecture.

[1]Further information on the hazards associated with sleep deprivation in physicians and others is available online at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1200708/

# 8.6: Dreaming: The Pageants of the Night

**Objective:** Evaluate the content, real-life relevance, causes, physiology, and functions of dreams

Every night of your life, a spectacular series of events is staged in your dreams. What produces these fantastic cognitive spectacles? And what—if anything—do they mean? As we saw earlier, sleep scientists now know that dreams occur regularly throughout the night, most often in REM sleep. They also know which parts of the brain control dreaming—including, especially, parts of the brain stem. What remains most mysterious about this stage of sleep is *why* we dream.

## 8.6.1: What Do We Dream About?

Decades of research, at home and abroad, offer important insights into the content of our dreams, and how our experiences influence that content. What have we learned, and how might it connect to your own dream experiences?

**DREAMS VARY BY CULTURE, GENDER, AND AGE** The influence of culture on dream content reveals itself in a variety of ways. For example:

- Reports from the West African nation of Ghana tell us dreams in that region often feature attacks by cows (Barnouw, 1963).
- Americans frequently find themselves embarrassed by public nudity in their dreams, although such reports rarely occur in cultures where people customarily wear few clothes.

- Images of death appear more often in dreams of Mexican American college students than in dreams of Anglo American students, probably because concerns about death are a more important feature of life in Latin American cultures (Roll and others, 1974).

In general, cross-cultural research lends support to Rosalind Cartwright's (1977) hypothesis that dreams reflect life events that are important to the dreamer.



Death-related images appear more often in dreams of Mexican American college students than in those of Anglo-American college students. This probably occurs because death is more prominently a part of Mexican culture, as can be seen in this figure used in the Day of the Dead celebration.

Sleep scientists also know that the content of dreams also varies by age and gender (Domhoff, 1996). Children are more likely to dream about animals than adults are, and the animals in their dreams are more likely to be large, threatening, and wild. In contrast, college students dream more often of small animals, pets, and tame creatures. This may mean children feel less in control of their world than adults do and thus see the world depicted in scarier imagery while they sleep (Van de Castle, 1983, 1994).

Women everywhere more commonly dream of children, while men more often dream of aggression, weapons, and tools (Murray, 1995). And American women may be more equal-opportunity dreamers than their male counterparts: In a sample of more than 1,800 dreams collected by dream researcher Calvin Hall, women dreamed about both men and women, while men more often dreamed about men—twice as often, in fact, as they dreamed about women. Hall also found that hostile interactions between characters outnumbered friendly exchanges, and that two-thirds of emotional dreams had a negative complexion, such as anger and sadness (Hall, 1951, 1984).

**DREAMS AND RECENT EXPERIENCE**   Dream content frequently connects with recent experience and things we thought about during the previous day. But, strangely, if you deliberately try *not* to think about something, it is even more likely to pop up in your dreams (Wegner and others, 2004). So, if you have been worrying about your job all day—or trying to forget about it—you're likely to dream about work tonight, especially during your first REM period.

Typically, then, the first dream of the night connects with events of the previous day. Dreams in the second REM period (90 minutes later) often build on a theme that emerged during the first REM period. And so it goes through the night, like an evolving rumor passed from one person to another: The final dream that emerges may have a connection—but only a remote one—to events of the previous day. Because the last dream of the night is the one most likely to be remembered, we may not recognize the link with the previous day's events (Cartwright, 1977; Kiester, 1980).

## 8.6.2:  Why Do We Dream?

Now that we know what types of things people dream about, let's investigate what the purpose of dreaming might be. Evolutionary psychologists propose dreams may offer safe opportunities to rehearse ways of dealing with dangerous situations, but the evidence is iffy (Franklin & Zyphur, 2005). Some cognitive psychologists see dreams as meaningful mental episodes, reflecting important events or fantasies in the dreamer's mental world. Other cognitive scientists are finding connections between dreaming and memory, and even propose that dreams help us construct meaning in our lives (Stickgold, 2011). But others argue dreams may have no meaning at all and are merely random brain activity during sleep. Let's look at all sides of this debate on the meaningfulness of dreams.

**CULTURAL PERSPECTIVES ON DREAMING**

- The ancient Israelites interpreted dreams as messages from God.
- Their Egyptian contemporaries attempted to influence dreams by sleeping in temples dedicated to the god of dreaming, Serapis.
- In India, the sacred Vedas described the religious significance of dreams.
- Meanwhile, in China, dreaming held an element of risk.

During a dream, the ancient Chinese believed the soul wandered about outside the body. For that reason, they were reluctant to awaken a sleeper hastily, lest the soul not find its way back to the body (Dement, 1980).

From the perspective of many African and Native American cultures, dreams are an extension of waking

reality. Consequently, when traditional Cherokee Indians dreamed of snakebite, they received appropriate emergency treatment upon awakening. Likewise, when an African tribal chieftain dreamed of England, he ordered a set of European clothes; and, when he appeared in the new togs, his friends congratulated him on making the trip (Dement, 1980).

In contrast with these folk theories, sleep scientists approach dreaming with this question: What biological function do dreams have? Most recently, researchers have been focusing on the cognitive functioning of dreams.

**DREAMS AND MEMORY**  Some of the most exciting research on dreams comes from cognitive neuroscience. For example, we now know that REM sleep helps us consolidate our memories. When students learned a difficult logic game, those who enjoyed a full night of REM sleep afterward performed better on the task the next day than did those deprived of postlearning REM (Smith, 2004). Indeed, the brain replenishes neurotransmitters in its memory networks during REM, notes sleep researcher James Maas. It may be that REM sleep helps weave new experiences into the fabric of old memories (Greer, 2004b).

---

**WATCH** The Connection Between Memory and Sleep

Research in sleep labs reveal how different types of sleep influence different types of memory. Watch this video to learn more: https://www.youtube.com/watch?v=ObuaXhtKbVY

---

Recent research suggests that NREM sleep also selectively reinforces certain kinds of memory, especially for facts and locations (Miller, 2007). In the lab of Harvard sleep scientist Bob Stickgold, students spent an hour working on a difficult three-dimensional maze problem on a computer, starting over repeatedly in new locations in the maze. One of their goals was to find and remember the location of a tree in the maze. Next, half the students took a nap while the other half engaged in quiet activity. Nappers were awakened from NREM sleep and questioned about their dreams. Non-nappers answered questions about their thoughts at the same intervals. Later, when students worked again on the maze problem, nappers who had dreamed about the maze found the tree more quickly than did other students in the study (Bower, 2010).

**DREAMS AS CLUES TO OUR UNCONSCIOUS**  In contrast to laboratory experiments of cognitive scientists examining the role of dreaming, some psychologists—particularly **psychoanalysts**—ascribe to a theory of dreaming proposed by Sigmund Freud. At the beginning of the 20th century, Freud laid out the most complex and comprehensive theory of dreams and their

meanings ever developed—a theory that has enjoyed enormous influence, despite lack of scientific evidence (Squier & Domhoff, 1998). In this view, dreams represent "the royal road to the unconscious," paved with clues to an individual's hidden mental life. For Freud, dream analysis became the cornerstone of psychoanalysis, as described in his classic book *The Interpretation of Dreams* (1900/2015).

In psychoanalytic theory, dreams have two main functions:

1. To guard sleep (by disguising disruptive thoughts with symbols)
2. To serve as sources of wish fulfillment

Freud believed dreams play their guardian role by relieving psychic tensions created during the day, and serve their wish-fulfillment function by allowing the dreamer to work harmlessly through unconscious desires.

Freud made an important distinction between a dream's **manifest content**—the dream's story line—and the **latent content**—the (supposed) symbolic meaning of the dream. Psychoanalytic therapists, therefore, scrutinize the manifest content of their patients' dreams for clues relating to hidden motives and conflicts lurking in the unconscious. For example, clues relating to sexual conflicts might take the form of long rigid objects or containers that, in Freudian theory, symbolize the male and female genitals. Similarly, a departure or a journey may represent a death, loss, or a new beginning.



The relationship between manifest and latent content of dreams can be compared to interpretations of art, such as Salvador Dali's *The Persistence of Memory.* Here, melting clocks and other surreal images would represent manifest content, and your interpretation of Dali's meaning the latent content.

Must you be a trained psychoanalyst to understand dreams? Not necessarily. In some cases, the manifest content of our dreams has a fairly obvious connection to our waking lives—thus, the symbolism is only thinly disguised. For example, one study found that individuals depressed about divorce often had dreams about past

relationships (Cartwright, 1984). By analyzing the patterns and content of your own dreams, you may be able to start to decode many of the images and actions you dream about (Hall, 1953/1966; Van de Castle, 1994). We must emphasize, however, there is little solid scientific support for Freudian interpretations of latent dream content.

**DREAMS AS RANDOM ACTIVITY OF THE BRAIN**   Not everyone believes dream content is meaningful. In particular, **activation-synthesis theory** argues that dreams result when the sleeping brain tries to make sense of its own spontaneous bursts of activity (Leonard, 1998; Squier & Domhoff, 1998). In this view, dreams originate in periodic neural discharges emitted by the sleeping brain stem. As this energy sweeps over the cerebral cortex, the sleeper experiences impressions of sensation, memory, motivation, emotion, and movement (the "activation" part of the theory). Although the cortical activation is random, and the images it generates may not be logically connected, the brain tries to make sense of the stimulation it receives. To do so, it weaves a coherent story that pulls together the "messages" in these random electrical bursts (the "synthesis" part of the theory). A dream, then, could merely be the brain's way of making sense out of nonsense.

The original proponents of this theory, J. Allan Hobson and Robert McCarley (1977), based their argument on the idea that the brain needs constant stimulation to grow and develop. During sleep, the brain blocks out external stimulation, so REM sleep steps in to provide stimulation from within. Dream content, therefore, results from brain activation, not from unconscious wishes or other meaningful mental processes. While Hobson (1988, 2002) still claims the story line in our dreams is added as a "brainstorm afterthought," he does acknowledge that a dreamer's unique synthesis of the activations may nevertheless have some psychological meaning based on the influences of culture, gender, personality factors, and recent events.

**DREAMS AS A SOURCE OF CREATIVE INSIGHTS**   Even if Hobson and McCarley are right—that dreams have no special meaning other than an attempt by the brain to make sense out of nonsense—dreams could still be a source of creative ideas. In fact, it would be astonishing if we did not turn to such wild and sometimes wonderful scenes in the night for inspiration. As we have seen, writers, composers, and scientists have done just that.

"Dream explorer" Robert Moss (1996) cites 19th-century physiologist Herman von Helmholtz, who insisted that creative dreaming would result from doing three things:

1. First, saturating yourself in a problem or issue that interests you

2. Next, letting your creative ideas incubate by shifting attention to something relaxing and unrelated

3. Finally, allowing yourself time to experience illumination, a sudden flash of insight into the answer you seek

Now, in the 21st century, empirical support is accumulating for this notion. In REM sleep, our brains seem primed to put ideas together in previously unconceived ways. When awakened from REM sleep and given word-association tasks, people produce more novel associations than when they are awake. And students studying complex math problems double their chances of finding novel solutions to the problem after a full night of sleep (Stickgold & Walker, 2004). It's as if our REMing brain is released from the boundaries of our waking sensibilities and uses the opportunity to try out new combinations of ideas—which is precisely the basis of creativity.

Try finding your own creative inspiration in dreams in the Do It Yourself activity.

## Do It Yourself!
## Finding Your Creative Inspiration in Dreams

One rainy Swiss summer day in 1831, a housebound trio of writers eagerly challenged each other to craft ghost stories. Yet, after several days of uninspired effort, Mary Wollstonecraft Shelley feared she would come up empty handed. Then one night, with the problem turning over in her mind, she fell asleep, only to awaken some time later with horrific dream images in her head. She later recalled them clearly:

> My imagination, unbidden, possessed and guided me . . . I saw the pale student of unhallowed arts kneeling beside the thing he had put together. I saw the hideous phantasm of a man stretched out, and then . . . show signs of life, and stir with an uneasy, half vital motion. . . . [The creator] would rush away from his odious handiwork, horror-stricken.

Early the next day she penned the words: "It was on a dreary night of November. . . ." Thus began the first draft of her "ghost story," *Frankenstein, or The Modern Prometheus*.

Have you ever thought your dreams could be the source of creative inspiration? If so, try this strategy, suggested by dream researcher Robert Moss.

- First, bring to mind an expert whom you admire in your field of endeavor.

- Before you go to sleep, imagine you are asking this person for help solving your problem; then tell yourself to dream the answer.

- When you wake up, quickly write or sketch all you can recall about your dreams. If you can't recall anything, write down whatever comes to mind.

- Find a friend with whom you can share your dreams, who will listen and provide nonjudgmental feedback that may

- help you find new insights into the meaning and images in your dreams.
- Later, when you review your notes, you may find that your approach to the problem has been "given a distinct tilt" (Moss, 1996). Your later interpretation of your dream thoughts might surprise you with insights you didn't even know you could achieve. Perhaps, if you take creative control of your dreams, you can create your own novel, just like Mary Shelley did with *Frankenstein*.

## Psychology Matters

## Sleep Disorders

Are you among the more than 100 million Americans who get insufficient or poor-quality sleep? Some of these sleep problems are job related. Among people who work night shifts, for example, more than half nod off at least once a week on the job! It is no coincidence that some of the world's most serious accidents—including the disastrous radiation emissions at the Three Mile Island and Chernobyl nuclear plants and the massive toxic chemical discharge at Bhopal—have occurred during late-evening hours when workers are likely to be programmed for sleep. Sleep experts assert that many accidents occur because key personnel fail to function optimally as a result of insufficient sleep—as we noted earlier in the case of the 2010 plane crash in India (Dement & Vaughan, 1999).

Along with these job-related sleep problems, several clinical sleep disorders are studied in the labs of sleep researchers. Some are common, while others are both rare and bizarre. Some are relatively benign, and some are potentially life threatening. The single element tying them together is a disruption in one or more parts of the normal sleep cycle.

**Insomnia** is usually the diagnosis when people feel dissatisfied with the amount of sleep they get. Its symptoms include chronic inability to fall asleep quickly, frequent arousals during sleep, or early-morning awakening. Insomnia sufferers number about one-third of all adults, making this the most common sleep disorder (Dement & Vaughan, 1999).

An occasional bout of sleeplessness, though, is normal—especially when you have exciting or worrisome events on your mind. And don't worry: These incidents pose no special danger—unless you try to treat the problem with barbiturates or over-the-counter "sleeping pills." These drugs disrupt the normal sleep cycle by cutting short REM sleep periods. As a result, they can actually aggravate the effects of insomnia by making the user feel less rested and more sleepy. A new generation of prescription drugs for the treatment of insomnia—the ones you see heavily advertised on TV—seems to avoid many of these problems, although long-term-use studies are still in progress (Harder, 2005). And side effects such as rebound insomnia and morning grogginess still plague some users. An alternative is psychological treatment employing cognitive–behavioral therapy, which has had remarkable success in helping people learn effective strategies for avoiding insomnia (Smith, 2001).

**How can you avoid insomnia? What do you think?**

There are a variety of ways you can control your own environment to promote a good night's sleep. Consider these:

- Try to go to sleep and wake up around the same time each day. This helps train your biological clock to sleep during the time you have available for sleep.
- Clear your mind of worries before you go to bed. If you have trouble with this, create a "worry journal" that you can use to write down whatever is on your mind before you go to sleep. Close the book and put it away, reminding yourself you can deal with all of it more effectively after a good night's sleep.
- Keep your sleep environment relaxing. Try to avoid using your bedroom for arguments or other active brain activities. Instead, create a sleep environment that makes you feel peaceful and safe. Via classical conditioning, this will help your body to associate your sleep area with relaxation, and promote good sleep.
- Develop a pre-sleep ritual that helps you relax. For example, take a warm bath or shower, meditate, or listen to music that helps you unwind.
- Keep your sleep environment dark. Light signals our bodies to be awake.
- Avoid television, computer work, or other electronic screen before bed. The blue light emitted from the screens tricks your brain into thinking it is still daytime. Turning off electronic screens, as well as dimming the other lights in your home, about an hour before bedtime will help your brain start to produce melatonin—which will help you fall asleep.
- Avoid heavy meals and excessive amounts of alcohol before bed. Both will disrupt your natural sleep cycle.
- Exercise regularly, but do it earlier in the day. Strenuous physical exercise in the several hours before bed will inhibit your ability to fall asleep quickly.

## Sleep Apnea

Another common disorder, **sleep apnea**, often goes unnoticed, apparent only as daytime sleepiness and a sleep partner's complaints about snoring. But behind the curtain of the night, the cause lies in an abnormality of breathing. A person with sleep apnea actually stops breathing for up to a minute, as often as several hundred times each night! (In case you're concerned, a brief cessation of breathing a few times each hour during the night is normal.) Most commonly, this results from collapse of the airway in the throat when the sleeper's muscle tone relaxes. The result is the second major symptom of sleep apnea: frequent loud snoring, occurring each time the patient runs short of oxygen and tries mightily to get air through the collapsed airway (Seligson, 1994). As breathing stops and the sleeper's blood oxygen level plummets, the body's emergency system kicks into gear, causing distress hormones to course through the body. In the process, the sleeper awakens briefly,

begins breathing again, and then falls back to sleep. Because most of this happens in deep sleep, there is usually no memory of the episode.

Failure to recognize the nature of the problem can cause those with sleep apnea—and their families and co-workers—to interpret unusual daytime behavior, such as inattention or falling asleep, as laziness or neglect. While this may be disruptive to relationships, sleep apnea can also have harmful biological effects that include damage to brain cells, along with elevated blood pressure that can impose dangerous levels of stress on the blood vessels and heart (Gami and others, 2005).

Occasional episodes of sleep apnea are likely to occur in premature infants, who may need physical stimulation to start breathing again. Further, any tendency toward sleep apnea can be aggravated by putting a young child to bed on his or her stomach. (Instead, sleep scientists strongly recommend "back to sleep.") Obviously, the problem can be lethal, and it is one possible cause of *sudden infant death syndrome* (SIDS). Until their underdeveloped respiratory systems mature, "preemies" must remain connected to breathing monitors while they sleep. In contrast, permanent breathing failure is not a strong concern for adults with sleep apnea, for whom treatment focuses on decreasing the hundreds of nightly apnea episodes. This is usually accomplished by using a device that pumps extra air into the lungs and keeps the airway open during sleep.

**Night terrors**, occurring primarily in children, pose no health threat—although they can be quite distressing. Typically, a night terror attack presents itself in the screaming of a terrified-looking child who is actually in Stage 4 sleep and very difficult to awaken. When finally alert, the child may still feel afraid but have no specific memory of what mental events caused the night terror. In fact, the whole experience is likely to be more memorable to beleaguered family members than to the child. Most children who go through a phase of night terrors generally grow out of it by adolescence.

Unlike garden-variety nightmares, sleep-terror episodes occur in deep sleep rather than in REM sleep. In this respect, they are like sleepwalking, sleep talking, and bed wetting, which also occur in Stage 4. All these conditions seem to have a genetic component. In themselves, they pose no danger, although sleepwalkers can inadvertently climb out of upper-story windows or walk into a busy street—so it pays to take some precautions. (Incidentally, it's just a myth that waking a sleepwalker is dangerous.) In most cases, sleepwalking and night terrors diminish or disappear in adulthood, but if they pose persistent and chronic problems, the individual should be evaluated by a sleep specialist. Bed wetting can usually be ameliorated by a simple behavior modification procedure that employs a pad with a built-in alarm that sounds when damp.

## Narcolepsy

One of the most unusual of sleep disorders, **narcolepsy**, produces sudden daytime sleep attacks, often without warning. But these are no ordinary waves of drowsiness. So suddenly do these sleep attacks develop that narcolepsy sufferers have reported falling asleep while climbing a ladder, or scuba diving under 20 feet of water. Narcoleptic sleep attacks may also be preceded by a sudden loss of muscle control, a condition known as *cataplexy.*

Strangely, anything exciting can trigger a narcoleptic episode. For example, these patients commonly report they fall asleep while laughing at a joke or even during sex. Obviously, narcolepsy can be dangerous—and not so good for intimate relationships, either.

Assembling the pieces of this puzzle, we find that narcolepsy is a disorder of REM sleep (Marschall, 2007). Specifically, a sleep recording will show that the narcolepsy victim has an abnormal sleep-onset REM period; that is, instead of waiting the usual 90 minutes to begin REM, the narcoleptic person enters REM as sleep begins. You may have already guessed that the accompanying cataplexy is simply REM **sleep paralysis**.

Studies of narcoleptic animals show that the disorder stems from a genetic problem affecting the sleep-control circuitry in the brain stem. Recent research implicates a diminished supply of *hypocretin,* a chemical produced in the hypothalamus (Harder, 2004; Marschall, 2007). So far, there is no cure, but certain drugs can diminish the frequency of both the sleep attacks and the cataplexy. Now that we know the cause is biological, narcoleptic patients are no longer sent to psychotherapy aimed at searching for the unconscious conflicts once assumed to underlie the disorder.

So, what should you do if you suspect that you have a sleep disorder, such as chronic insomnia, sleep apnea, or narcolepsy? An evaluation by a sleep expert is the place to start. Many hospitals have sleep disorder clinics to which your physician or clinical psychologist can refer you.

# Key Question: What Other Forms Can Consciousness Take?

## Core Concept 8.3

**An altered state of consciousness occurs when some aspect of normal consciousness is modified by mental, behavioral, or chemical means.**

Children stand on their heads or spin around to make themselves dizzy. You may seek similar sensations from hair-raising theme-park rides or sky diving. But why do we do these strange things to ourselves? One view says "human beings are born with a drive to experience modes of awareness other than the normal waking one; from very young ages, children experiment with techniques to change consciousness" (Weil, 1977, p. 37). So sleep, dreams, fantasies, and thrilling experiences offer compelling alternatives to everyday conscious experience.

Psychological techniques, such as hypnosis and meditation, can alter consciousness, too. So can drugs, which some people use to find the altered state of consciousness they seek. In this section, we will explore these variations on consciousness and find the theme that ties these altered states of consciousness together. As our core concept puts it:

An altered state of consciousness occurs when some aspect of normal consciousness is modified by mental, behavioral, or chemical means.

This notion carries the important implication that altered states do not involve mysterious or paranormal phenomena that defy rational explanation. Rather, altered states are modifications of ordinary consciousness that we can study with the tools of science. Let's begin with what we know about hypnosis.

By the end of this section, you will be able to:

**8.7**   **Describe the processes and practical uses of hypnosis**

**8.8**   **Outline the cultural perspectives and effects of meditation**

**8.9**   **Recount the effects of different types of psychoactive drugs**

# 8.7:  Hypnosis

**Objective:**  **Describe the processes and practical uses of hypnosis**

The cartoon images have it wrong. Neither the hypnotist's eyes nor fingertips emit strange, mesmerizing rays that send subjects into a compliant stupor—nor does a dangling shiny bauble have the power to control people's minds. A more accurate picture would show the hypnotist making suggestions to promote concentration and relaxation (Barber, 1976, 1986). Soon the subject appears to be asleep, although he or she can hear suggestions and carry out requests. But this real-life depiction can be just as dramatic as the cartoon images: In some cases, the individual under hypnosis demonstrates amazing powers to ignore pain, remember long-forgotten details, and create hallucinations. But what mental processes make these things happen?

The term **hypnosis** derives from *Hypnos,* the Greek god of sleep. Yet EEG records tell us that ordinary sleep plays no role in hypnosis, even though hypnotized individuals may appear to be in a relaxed, sleeplike state. In fact, there is no unique EEG signature for hypnosis. Most authorities would define hypnosis as a state of awareness characterized by deep relaxation, heightened suggestibility, and focused attention.

When deeply hypnotized, some people respond to suggestion with dramatic changes in perception, memory,

motivation, and sense of self-control (Orne, 1980). Stage hypnotists can make carefully selected volunteers quack like a duck or appear to enjoy the taste of a bitter lemon. Afterward, people often report they experienced heightened responsiveness to the hypnotist's suggestions and performed their behavior without intention or conscious effort. But are all people susceptible to hypnosis?

## 8.7.1:  Hypnotizability

Dramatic stage performances of hypnosis give the impression that hypnotic power lies with the hypnotist. But the real star is the person who is hypnotized. The hypnotist is more like an experienced guide showing the way. And some individuals can even learn to practice self-hypnosis, or autohypnosis, by inducing the hypnotic state through self-administered suggestions.

The single most important factor in achieving a hypnotic state is susceptibility. Experts call this **hypnotizability** and measure it by a person's responsiveness to standardized suggestions. Individuals differ in this susceptibility, varying from complete unresponsiveness to any suggestion to total responsiveness to virtually every suggestion. A highly hypnotizable person may respond to suggestions to move his or her arms, walk about, experience hallucinations, have amnesia for important memories, and become insensitive to painful stimuli. And, we should add, because hypnosis involves heightened suggestibility, any "recovered memories" obtained by this means are highly suspect.

Hypnotizability also depends on age. Among adults, only 10% to 15% are highly hypnotizable, while up to 85% of children fall into that category (Blakeslee, 2005). Figure 8.8 shows the percentage of college students who achieved various levels of hypnotizability the first time they were given a hypnotic induction test. For example, a hypnotist may test a new subject's acceptance of suggestion by saying, "Your right hand is lighter than air," and observing whether the subject allows his or her arm to float upward.

**Figure 8.8**  Level of Hypnosis Reached at First Induction

This graph shows the results achieved by 533 participants hypnotized for the first time. (Hypnotizability was measured by the 12-item Stanford Hypnotic Susceptibility Scale.)

High scorers are more likely than low scorers to experience pain relief, or hypnotic analgesia, and to respond to hypnotic suggestions for experiencing perceptual distortions.

## 8.7.2:  Is Hypnosis a Distinct State of Consciousness?

Experts disagree about the psychological mechanisms involved in hypnosis (Kirsch & Lynn, 1995, 1998). Some believe hypnosis is a distinct state of consciousness, quite separate from sleep or our normal waking state (Fromm & Shor, 1979). Others propose that hypnosis is simply suggestibility (Barber, 1979; Kirsch & Braffman, 2001). In this latter view, hypnotic subjects are not entranced but merely motivated to focus their attention and respond to suggestion. Yet a third view argues that hypnosis is essentially a social process, involving role playing—in which people act as they believe a hypnotized person would, often to please the hypnotist (Sarbin & Coe, 1972). In support of this view, critics of hypnosis as an "altered state" note that people who have *not* been hypnotized can duplicate apparently amazing feats, such as becoming "human planks" suspended between two chairs.



The "human plank" is one of the earliest stage tricks used by performers pretending to hypnotize people.

One intriguing perspective, originally proposed by researcher Ernest Hilgard (1992), portrays hypnosis as a dissociated state, involving a "hidden observer" in the person's mind, operating in parallel with normal consciousness. Hilgard has shown that hypnotized individuals who say they feel no pain when their hand is placed in ice water will nevertheless respond affirmatively when told, "If some part of you does feel pain, please raise your right index finger." Hilgard believed that attention to the painful sensation was shifted to the hidden observer, leaving normal consciousness blissfully unaware.

Finally, a cognitive view proposes that hypnosis involves a shift in **top-down processing**; that is, thinking driven by expectations and mental imagery rather than by incoming stimulation. Thus, people are hypnotized because they want or expect to be, so they focus on expressing and achieving the responses the hypnotist tries to evoke. To test this idea, neuroscientist Amir Raz and his colleagues altered volunteers' top-down processing by

means of hypnotic suggestions that they would "forget" how to read. Brain scans showed the suggestion temporarily inactivated the part of their brains that decodes words (Blakeslee, 2005; Raz and others, 2002).

In support of the idea that hypnosis creates profound top-down changes in the brain, another study suggested to deeply hypnotized patients they were touching uncomfortably warm metal. What happened? The parts of their brains associated with pain perception "lit up" in the same pattern found in brain scans of a control group who actually touched a 120-degree metal rod (Derbyshire and others, 2004; Winerman, 2006b).

Is there common ground among these perspectives? Perhaps all have a bit of the truth. It may be that hypnosis, like the normal waking state, can cover a whole range of dissociated states, intensified motives, shifted expectations, and social interactions.

## 8.7.3:  Practical Uses of Hypnosis

Stage tricks aside, what is hypnosis good for?

- Because of its powerful influence on psychological and physical functions in some people, hypnosis is a useful tool for researchers studying the mind–body connection (Oakley, 2006).

- By using normal volunteers under hypnosis, an experimenter can induce temporary mental conditions, such as anxiety, depression, or hallucinations, instead of having to find individuals who already have these problems. For example, in one study of psychological issues associated with hearing loss, college students given the hypnotic suggestion to become deaf on cue reported feeling paranoid and excluded because they could not hear what other subjects were saying and assumed they were being deliberately whispered about and excluded (Zimbardo and others, 1981).

- Hypnosis can aid in psychological treatment, too. For instance, it can be an effective tool in desensitizing people with phobias (fears) of heights or spiders.

- It can also be part of a relaxation training program designed to combat stress.

- In addition, therapists find it useful for eliminating unwanted behaviors, such as smoking, where a frequently used technique calls for planting posthypnotic suggestions to diminish a patient's cravings for nicotine (Barnier & McConkey, 1998; Kihlstrom, 1985).

- In the same way, a therapist can also induce the patient to forget events that occurred during or prior to the hypnotic session, an effect called *posthypnotic amnesia.*

- Finally, hypnosis has a growing role in pain management, especially during procedures that would otherwise involve the risks of anesthesia (Nash, 2001; Patterson, 2004).

It is important to note, however, that not everyone can be hypnotized deeply enough for effective pain relief (Callahan, 1997). Still, hypnosis alone allows some patients to undergo treatments that would otherwise cause excruciating pain (Finer, 1980), in some cases masking pain more effectively than acupuncture, aspirin, Valium, or even morphine (Stern and others, 1977). In randomized, experimental studies, hypnosis has reduced pain across a wide variety of conditions, including women with metastatic breast cancer, patients with dental sensitivity, and survivors of physical trauma, just to name a few (Nash & Tasso, 2010; Patterson and others, 2010). Chronic pain conditions such as arthritis, fibromyalgia, and headaches have also been treated effectively with hypnosis (Patterson, 2010).

How does hypnosis produce pain relief? Hilgard's hidden-observer explanation is one possibility, although other scientists have taken a more biological approach to the problem. Currently there is no universally accepted explanation, although we can rule out one contender. Experiments have demonstrated that the opiate-like **endorphins**, which account for the pain-relieving property of placebos, are *not* responsible for hypnotic analgesia (Grevert & Goldstein, 1985). For now, we will accept hypnosis as a valuable tool, although much remains to be learned concerning precisely how it alters consciousness.

# 8.8:  Meditation

**Objective:**  **Outline the cultural perspectives and effects of meditation**

Many religions and traditional psychologies of Asian and Pacific cultures use forms of **meditation** to direct consciousness away from worldly concerns and temptations. Although the purpose of meditation varies, many practitioners seek some form of spiritual enlightenment and an increase in self-knowledge and well-being. Meditators use a variety of techniques but commonly begin by concentrating on a repetitive behavior (such as breathing), assuming certain body positions (yogic postures), and minimizing external stimulation. Meditation can last from just a few minutes to several hours and produces relaxation, changes in brain waves and density, lower blood pressure, a decrease in stress hormones, and perhaps new insights.

## 8.8.1:  Cultural Perspectives on Meditation

Viewing meditation as an altered state of consciousness may reflect a particularly Western worldview, because Asian beliefs about the mind are typically different from those of Western cultures (Austin, 1998; Rosch, 1999). Buddhism, for example, teaches that the visible universe is an illusion of the senses. To become enlightened, a Buddhist aims to control bodily yearnings, to stop ordinary experiences of the senses and mind, and to see things in their truest light. Thus, in the Buddhist view, meditation more accurately captures reality.

In contrast with its long history in Asia and the Pacific, meditation has only recently been taken seriously by psychology as a subject for scientific study. Its spiritual aspects aside, early studies indicated meditating was in many ways like resting, because it reduced various signs of bodily arousal (Morrell, 1986). Newer studies, however, are finding a provocative array of changes in the brain associated with meditation—changes that, in turn, may affect empathy, self-awareness, attention, and stress.

## 8.8.2:  Effects of Meditation

Experienced meditators show changes in brain wave patterns, especially in frontal lobe activity, associated with positive emotions (Davidson and others, 2003; Kasamatsu & Hirai, 1966). Other studies link meditation with beneficial changes in blood pressure and stress hormones (Seeman and others, 2003). Research also finds that meditation produces relaxation and reduces anxiety, especially in people who live and work in stress-filled environments (Benson, 1975; van Dam, 1996)—although some research with control groups does not show meditation to be superior to other relaxation techniques (Toneatto & Nguyen, 2007). Meditation also seems to produce at least short-term gains in attention and problem solving (van den Hurk and others, 2010). And a first-of-its-kind study using MRI scans to study the brains of people before and after 8 weeks of meditation training discovered what happens in the brain to explain these findings: The hippocampus, parts of the frontal lobes, and brain areas relevant to learning, memory, compassion, and attention all increased in size in the meditators as compared to a control group (Hölzel and others, 2011). Furthermore, the density of meditators' **amygdalas** decreased, providing a clue to the role of meditation in stress reduction.

---

**WATCH**  "What's in It for Me? Altered States of Consciousness"



Harvard Medical School's Dr. Sarah Lazar discusses the effects of meditation on the numerous aspects of the brain, both during and after engaging in it.

The overall picture shows meditation to be an effective method for relaxing, reducing stress, disengaging from worldly concerns, and—possibly—improving cognitive function. It also produces health-promoting physical changes. And increasingly, practitioners in medicine and in psychology are seeking to understand it and try to harness it for therapeutic purposes (Barinaga, 2003). But whether meditation holds an advantage over other techniques—psychological, physical, and spiritual—awaits findings of future research.

# 8.9: Psychoactive Drug States

**Objective:** Recount the effects of different types of psychoactive drugs

For millennia, humans have used alcohol, opium, cannabis, mescaline, coca, caffeine, and other drugs to alter their everyday perceptions of reality. Especially under stress, people throughout the world take drugs for pleasure, for relaxation, or just to avoid the cares of their daily lives. Some drugs, such as LSD, are taken in pursuit of hallucinations. Other drugs (alcohol is an example) can act as "social lubricants" to help people feel comfortable with each other. Still others are used by those seeking a euphoric "rush," a "buzz," a state of tranquility, or even stupor. What, if anything, do all these drugs have in common?

To some extent, all **psychoactive drugs** impair brain mechanisms that usually help us make decisions (Gazzaniga, 1998a). In addition, the most widely abused drugs, such as cocaine, heroin, cannabis, and methamphetamines, all stimulate the brain's "reward circuits." From an evolutionary perspective, our brains are built to find pleasure in many substances (such as the taste of sweet or fatty foods) that helped our ancestors survive and reproduce. Cocaine, heroin, and amphetamines trick the brain by exploiting these same mechanisms with strong, direct, and pleasurable signals that make our bodies "think" that these substances are good for us (Nesse & Berridge, 1997).

## 8.9.1: Trends in Drug Use

Cultural trends widely influence drug-taking behavior. The United States saw this vividly during the 1960s and 1970s, when the country entered a period of casual experimentation with recreational drugs and other mind-altering techniques. Data from several sources, including emergency room visits, drug arrests, and surveys, indicates that overall illicit drug use has declined since the early 1990s. Today, while almost half of adults have tried drugs, only about 15% have used an illicit drug in the past year. Marijuana remains by far the most common, accounting for more than half of illicit drug use (although recent laws in many states make marijuana legal). Recreational use of prescription drugs (such as Vicodin and Oxycontin) accounts for about 30%, and cocaine and hallucinogens account for only about 10% each—which translates to about one person in 75 for the latter two. Alcohol and tobacco far outstrip illicit drugs in popularity, however: About two-thirds of adults in America drink alcoholic beverages, and one in four uses tobacco products (Substance Abuse and Mental Health Services Administration [SAMHSA], 2010).

Age of drug use varies as well, with peak use between the ages of 18 and 20. Use declines steadily as age increases—with one curious exception: Recent data show that drug use among 50-somethings has more than doubled since 2002. Experts explain this aberration as a result of the influx of Baby-Boomers into this age range—a unique generation of Americans who came of age in a culture of drug use and apparently never gave it up (SAMHSA, 2009).

Among teens, use of some drugs is falling while use of others is on the rise (see Figure 8.9).

Cigarette smoking is at its lowest point in 35 years—but teens still face the same dangers of nicotine through increasing use of e-cigarettes and hookahs. In just 1 year, in fact, use of e-cigarettes tripled in middle-school and high-school students, while more than twice as many students used hookahs than the year before (Centers for Disease Control and Prevention, 2015). Overall, then, nicotine use has not declined, and researchers remain

**Figure 8.9** Trends in an Annual Illicit Drug Use Index

This graph shows the percentage of teens reporting the use of illegal drugs.

concerned about its effects on the developing teen brain, as well as its addictive nature. Alcohol use, including binge drinking, is decreasing as well, as is use of hallucinogens, cocaine, and methamphetamine. Use of MDMA (ecstasy)—after a big upswing in the years prior to 2010—has returned to a level of about 1 in 20 high school seniors ever having taken the drug. Nonprescription use of Vicodin and Oxycontin has also declined sharply in the past few years. Marijuana use remains stable, with slightly less than half of high school seniors having used it at some point in their life.

**Figure 8.10** Trends in Drug Use





**WRITING PROMPT**

**Why Is Nicotine Still Popular?**

Even though fewer people smoke cigarettes today than in years past, nicotine use remains high due to use of e-cigarettes and hookah. Why do you think teens continue to engage in nicotine use? What about other drugs?

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

**OVERVIEW OF DRUG CLASSIFICATIONS, USES, AND EFFECTS** Let us now have a closer look at the most commonly used and abused psychoactive drugs, grouping them in categories: **hallucinogens**, **opiates**, **depres-**
sants, and **stimulants** (see Table 8.1). In general, all the drugs in each category have similar effects on the mind and brain.

## 8.9.2: Hallucinogens

The class of drugs known as **hallucinogens** produces changes in consciousness by altering perceptions, creating hallucinations, and blurring the boundary between the self and the external world. For example, an individual experiencing hallucinogenic effects might listen to music and suddenly feel he or she is producing the music or that the music is coming from within. Most hallucinogenic drugs act in the brain at specific receptor sites for the neurotransmitter **serotonin** (Jacobs, 1987).

Commonly used hallucinogens include *mescaline* (made from a type of cactus), *psilocybin* (from a mushroom), *LSD* or "acid," and *PCP* (also called phencyclidine or "angel dust"). Both LSD and PCP are synthetic drugs made in chemical laboratories. PCP was a favorite of young people who used hallucinogens until word got around that the intensity and duration of its effects were quite unpredictable. The drug produces a strange dissociative reaction in which the user feels disembodied or removed from parts of his or her personality. Users may become confused or insensitive to pain and, when using high doses, experience convulsions or even death.

*Cannabis,* or marijuana, derived from the hemp plant (used to make rope as well as dope), acts primarily as a hallucinogen. (Experts disagree to some extent on its classification, however, as it also has properties of stimulants and depressants.) Its active ingredient is *THC* (tetrahydrocannabinol), found in both the plant's dried leaves and flowers and in its solidified resin (hashish). Most commonly it is smoked, although it can also be eaten.

The experience obtained from ingesting THC depends on its dose and the relative strength. Small doses may create mild, pleasurable highs, and large doses can cause long hallucinogenic reactions. Unlike alcohol, its effects can last for many hours—long after users feel the drug's influence has ended. The pleasant effects include altered perception, sedation, pain relief, mild euphoria, and distortions of space and time—similar in some respects to the effects of heroin (Wickelgren, 1997). Depending on the social context and expectations, the effects can also be an unpleasant mixture of fear, anxiety, and confusion. In addition, cannabis often produces temporary failures in memory, as well as impairments in motor coordination. Those who work or drive under its influence suffer a higher risk of accidents—and those who attempt to study under its influence are likely to be wasting their time.

Some habitual cannabis users become psychologically addicted to its pleasurable effects, craving it so often that it interferes with other pursuits, including school or work.

### Table 8.1  Characteristics of Psychoactive Drugs

| Drug | Medical Uses | Common Effects Reported by Users |
|---|---|---|
| **Opiates** | | |
| Morphine | Painkiller, cough suppressant | Euphoria ("rush"), tranquility, drowsiness |
| Heroin | No medical uses in the United States | Euphoria, tranquility, drowsiness (more powerful than morphine) |
| Codeine | Painkiller, cough suppressant | Euphoria, drowsiness, "silliness" |
| Methadone | Treatment of heroin addiction | Slow action prevents heroin craving |
| **Hallucinogens** | | |
| Mescaline | None | Hallucinations, sensuality; similar to LSD but fewer reported emotional responses |
| Psilocybin | None | Well-being, perceptual distortions, less emotionally intense than LSD |
| LSD | None | Hallucinations, often emotional reactions |
| PCP | Veterinary anesthetic | Body image distortions, amnesia, unpredictable emotional reactions, dissociation (feeling of being cut off from one's environment) |
| Cannabis | Reduces nausea from chemotherapy; reduces pressure in the eye; may reduce seizures and treat pain | Euphoria, time distortion, intensified sensory experience |
| **Depressants and Antianxiety Drugs** | | |
| Barbiturates | Sedative, sleep, anticonvulsant, anesthetic | Relaxation, sedation, euphoria |
| Benzodiazepines | Antianxiety, sleep, anticonvulsant, sedative | Stress and anxiety reduction ("tranquilizing") |
| Rohypnol | None in United States (elsewhere: sedation, anxiety, anesthesia, and treatment of insomnia) | Same as other benzodiazepines, but longer lasting; also amnesia (hence its reputation as the "date-rape drug") |
| Alcohol | Antiseptic | Relaxation, well-being, cognitive and motor impairment |
| **Stimulants** | | |
| Amphetamines | Weight control, ADHD, counteract anesthesia | Confidence, mental energy, alertness, hallucinations, paranoia |
| Methamphetamine | None | Same as other amphetamines, but more intense |
| MDMA (ecstasy) | None (originally an appetite suppressant) | Euphoria, hot flashes, perceptual distortions, excitement |
| Cocaine | Local anesthetic | Much the same as amphetamines, sexual arousal (except in chronic users), dramatic mood changes as effects wear off (irritability, depression) |
| Nicotine | Gum, patch for cessation of smoking | Stimulant effect, relaxation, concentration, reduces nicotine craving |
| Caffeine | Weight control, stimulant in acute respiratory failure, analgesia | Stimulant effect, increased alertness and concentration |

The potential for physical dependence on this drug, however, is lower than most other psychoactive substances (Grinspoon and others, 1997; Pinel, 2005).

*What causes the mind-altering effects of this drug?* In the brain, THC causes the release of dopamine, which suggests an effect on the brain's reward system (Carlson, 2007). Neuroscientists have discovered cannabis receptors in many other parts of the brain, too (Nicoll & Alger, 2004; Wilson & Nicoll, 2002). This strongly suggests that the brain makes its own THC-like chemicals, which it uses to modulate information flow. Thus, marijuana and hashish seem to produce their mind-altering effects by exploiting the natural chemistry of the brain. Their interference with thinking and memory, then, is no wonder, because these receptors are particularly abundant in pathways involving these functions.

An evolutionary perspective suggests that the brain's own cannabis must have some beneficial function. Following this lead, a few neuroscientists are exploring just what the brain's "natural marijuana," more properly termed *endocannabinoids,* does for us. The hope is to even-

tually develop new therapies for a variety of human afflictions linked to brain areas that respond to THC, including circuits implicated in appetite, pain, nausea, and addiction. Thus, the research may lead to new treatments for obesity, chronic pain, the nausea produced by chemotherapy, and addiction by developing drugs to regulate the body's use of its own endocannabinoids (Marx, 2006; Nicoll & Alger, 2004).

Cannabis has some current medical uses, especially in treating nausea associated with chemotherapy, in reducing eye pressure associated with glaucoma, and in treating certain seizure disorders. Some physicians and patients, however, dislike the "high" and consider it an unpleasant side effect of cannabis when they use it for medical treatment. Recently, scientists helped solve that problem by developing a strain of cannabis that offers the treatment benefit without the mind-altering effects traditionally associated with marijuana. **CBD, or cannabidiol**, is a compound in cannabis that runs a different course in the brain pathways than does its companion compound THC, and as a result does not have the same psychoactive effect (Fernández-

Ruiz and others, 2013). Through selective breeding, growers have created a type of cannabis that is high in CBD with little or no THC.



An increasing number of states have recently passed legislation legalizing marijuana for medical and/or recreational purposes.

### 8.9.3: Opiates

Another class of drugs, known as **opiates**, includes *morphine, heroin,* and *codeine*—all made from the opium poppy. These are highly addictive drugs that suppress physical sensation and response to stimulation. As a result, some of them have found wide use in medicine, where they have particularly good analgesic (pain-relieving) properties, serve as cough suppressants, and aid in managing diarrhea.

Derived from morphine, heroin originally was developed in 19th-century Germany by the Bayer Company (of aspirin fame) but was abandoned because it is so highly addictive (more so than morphine). For the intravenous heroin user, however, the drug is attractive because, in the absence of pain, it gives a strong rush of pleasurable sensations. These feelings of euphoria supplant all worries and awareness of bodily needs, although—surprisingly—there are no major changes in cognitive abilities. Under heroin's influence, the user can usually converse normally and think clearly. Unfortunately, serious addiction is likely once a person begins to inject heroin for pleasure. To avoid the intense cravings and painful sensations of withdrawal, the addict must take the drug frequently—at least daily—making it a very expensive habit to maintain.

In recent years, several opiate-based drugs have come on the market, under brand names such as Oxycontin, Vicodin, Darvon, Percodan, and Demerol. Medically, they are effective painkillers, although their potential for addiction is high in chronic users. Unfortunately, because they produce the same feel-good effects as other opiates, they are also widely abused.

Like marijuana, opiates have special receptor sites in the brain. The discovery of these opiate receptors led to the realization that the brain makes its own opiates, the **endorphins**, which act as the body's natural analgesics or painkillers. This research stimulated a quest for drugs that have the same pain-fighting qualities as opiates but without their addictive properties. The hope is, so far, unfulfilled.

*Methadone,* a synthetic opiate, can be taken orally and therefore doesn't require injection. It has essentially the same euphoric, analgesic, and addictive effects as heroin but doesn't produce the same "rush" because the drug level in the brain increases slowly. This feature makes methadone useful as a substitute for heroin in drug treatment programs, in which the patient is switched to methadone and then gradually weaned from opiates altogether.

Paradoxically, patients who take opiates for pain control under medical supervision rarely become highly addicted. The reason for the difference in effects between the use of opiates for pleasure and for pain is unclear. It appears, however, the presence of pain causes opiates to affect parts of the brain other than the "reward centers" involved in pleasure. The practical point is this: There is little to fear from legitimate and careful medical use of opiates for controlling pain (Melzack, 1990).

### 8.9.4: Depressants and Antianxiety Drugs

The broad class of drugs that slows mental and physical activity by inhibiting activity in the central nervous system is collectively known as **depressants**. (Depressants don't necessarily make people feel clinically depressed, in the sense of "sad.") They include *barbiturates* (usually prescribed for sedation), *benzodiazepines* (antianxiety drugs), and *alcohol* (a social stimulant and nervous system depressant). In appropriate dosages, these drugs can relieve symptoms of pain or anxiety, but overuse or abuse is dangerous because they impair reflexes and judgment. They may also be addictive.

- **Barbiturates**, commonly used in sleeping pills, can induce sleep. In doing so, however, they have the unfortunate side effect of interfering with REM sleep. As a result, the user wakes up groggy and at risk for severe REM rebound, filling sleep with unpleasant dreams. Worse yet, overdoses of barbiturates may cause loss of consciousness, sometimes to the point of coma and even death. Fatal reactions to barbiturates are made all the more likely because the lethal dose is relatively close to the dose required for inducing

sleep or other desired effects. The chance of accidental overdose can be compounded by alcohol or other depressant drugs, which magnify the depressant action of barbiturates (Maisto and others, 1995).

• **Benzodiazepines** (pronounced *BEN-zo-dye-AZ-a-peens*), commonly prescribed to treat anxiety, are safer than barbiturates and reduce anxiety without causing sleepiness or sedation. For this reason, physicians often call them "minor tranquilizers"—the best-known and most widely prescribed include Valium and Xanax.

While most benzodiazepines are relatively safe, they can be overused and abused. Overdoses produce poor muscle coordination, slurred speech, weakness, and irritability, while withdrawal symptoms include increased anxiety, muscle twitching, and sensitivity to sound and light. Significantly, benzodiazepines are almost never taken by recreational drug users because people who are not suffering from anxiety usually do not like their effects (Wesson and others, 1992).

**ALCOHOL**   Another drug that acts as a brain depressant, alcohol, was one of the first psychoactive substances used by humankind. Under its influence, people have a variety of reactions involving loosening of inhibitions. At first, this may seem like a contradiction: How can a depressant make people less inhibited? What actually happens is that alcohol depresses activity in the brain circuits that control self-monitoring of our thoughts and behavior. The result depends on the context and the personality of the imbiber, who may become more talkative or quiet, friendly or abusive, ebullient or, sometimes, psychologically depressed. Alcohol's effects also depend on whether other drugs, such as MDMA or Rohypnol (a form of benzodiazepine sometimes known as the "date-rape drug"), are being used simultaneously. Such drugs are believed by users to enhance social interaction and empathy, although their effects can easily spin out of control, especially in combination with alcohol (Gahlinger, 2004).

Physically, alcohol in small doses can induce relaxation and even slightly improve an adult's reaction time. In just slightly larger amounts, it impairs coordination and mental processing—although sometimes drinkers believe their performance has been improved. Moreover, it is quite easy for alcohol to accumulate in the system because the body may not metabolize it as fast as it is ingested. In general, the body breaks down alcohol at the rate of only 1 ounce per hour, and greater amounts consumed in short periods stay in the body and depress activity in the central nervous system. When the level of

alcohol in the blood reaches a mere 0.1% (1/1000 of the blood), an individual experiences deficits in thinking, memory, and judgment, along with emotional instability and coordination problems. In some parts of the United States, this level of blood alcohol qualifies a driver as being legally drunk. (Most states, in fact, set a somewhat lower limit of 0.08% as the legal threshold for drunkenness.)

Distillers, brewers, and wine makers spend millions of dollars annually promoting the social and personal benefits of alcoholic beverages. And, to be sure, many adults use alcohol prudently. Nevertheless, an estimated 5% to 10% of American adults who use alcohol drink to the extent that it harms their health, career, or family and social relationships. To some extent, the problem is rooted in our genes—but genetics is far from the whole answer (Nurnberger & Bierut, 2007). People also *learn* to abuse alcohol, often in response to social pressure. Eventually, physical dependence, tolerance, and addiction develop with prolonged heavy drinking—of the sort that often begins with binge drinking, common on college campuses. When the amount and frequency of drinking alcohol interferes with job or school performance, impairs social and family relationships, and creates serious health problems, the diagnosis of *alcoholism* is appropriate (see Julien, 2007; Vallee, 1998).

Abuse of alcohol is a significant problem for more than 17 million Americans (Adelson, 2006; Grant & Dawson, 2006). And alcoholism affects more than just the individual drinker. For example, alcohol ingested by a pregnant woman can affect the fetus and is a leading cause of intellectual disability (Committee on Substance Abuse, 2000). Alcohol abuse affects other family members, too: Some 40% of Americans see the effects of alcohol abuse in their families (Vallee, 1998). The problem is especially prevalent among White males and young adults, where it can become lethal—alcohol-related automobile accidents are the leading cause of death in the 15-to-25 age group.

## 8.9.5: Stimulants

In contrast with depressants, **stimulants** speed up central nervous system activity. The result is a boost in both mental and physical activity level, which is why long-distance truck drivers sometimes use them to stay awake behind the wheel. Paradoxically, stimulants can also increase concentration and reduce activity level, particularly in hyperactive children with attention-deficit/hyperactivity disorder (ADHD). Physicians also prescribe them for narcoleptic patients to prevent sleep attacks.

Recreational users of stimulants seek other effects, including intense pleasurable sensations, increased self-confidence, and euphoria.

1. *Cocaine,* in particular, packs what may be the most powerfully rewarding punch of any illegal drug (Landry, 1997).
2. Crack, an especially addictive form of cocaine, produces a swift, pleasurable high that also wears off quickly.
3. Amphetamines (often called "speed") and related drugs have effects comparable to cocaine.

Among these, a particularly notorious variant known as *methamphetamine* came into widespread use during the 1990s. Use of "meth" can lead to severe health problems, including physical damage in the brain.

Still another stimulant, known as *MDMA* (often called "ecstasy"), has grown popular in "rave" culture, where it has a reputation for creating a feeling of euphoria and closeness to others (Thompson and others, 2007). It is also known for energizing users to dance for hours, sometimes leading to convulsions, death, and other unpleasant consequences (Gahlinger, 2004; Yacoubian and others, 2004). Ecstasy produces increased blood pressure and heart rate, hyperthermia (elevated temperature), and dehydration. Long-term use is also known to impair attention, learning, and memory, probably through impairment of serotonin-using neurons (Levinthal, 2008; Verbaten, 2003).

Stimulant drugs hold other dangers as well. Heavy amphetamine and cocaine users may experience frightening hallucinations and paranoid delusions—symptoms also associated with severe mental disorder. And these drugs can send users on an emotional roller coaster of euphoric highs and depressive lows, leading to an increase in frequency and dosage, quickly making the abuse of such drugs spiral out of control. Yet another danger accrues to "secondhand" users: Children exposed to cocaine in their mother's blood while in the womb are at increased risk for developing cognitive problems, emotional difficulties, and behavior-control disorders (Vogel, 1997).

Two other stimulants you may not even think of as psychoactive drugs are *caffeine* and *nicotine*—yet their effects on the brain are swift and powerful. Within 10 minutes, two cups of strong coffee or tea deliver enough caffeine to have a measurable effect on the heart, blood circulation, and brain signals. Nicotine inhaled in tobacco smoke can have similar effects within just seconds. Both drugs are addictive, and both augment the effects of natural reward chemicals released by the brain. In this way, nicotine and caffeine tease the brain's reward pathways into responding as if using these substances were associ-

ated with something beneficial. Fortunately, in the case of caffeine, the negative effects are minor for most people. Further, caffeine has a built-in "braking" action that limits its intake because high dosages also produce uncomfortable anxiety-like feelings.



Brain changes during use of drugs can be seen on PET scan images. Much less activity is seen in the limbic system of the brain under the influence of amphetamines.

In contrast to caffeine, nicotine is a much more dangerous drug for two reasons:

1. Nicotine is highly addictive.
2. It has been associated with a variety of health problems, including cancer, emphysema, and heart disease.

In fact, the negative impact of smoking on health is greater than that of all other psychoactive drugs combined—including heroin, cocaine, and alcohol. According to the U.S. Public Health Service, smoking is the leading cause of preventable disease, carrying a human cost of about 438,000 deaths annually (Centers for Disease Control and Prevention, 2007). As a result, the American Medical Association has formally recommended that the U.S. Food and Drug Administration regard nicotine as a drug to be regulated.

## 8.9.6: The Altered States of Anesthesia

While anesthetics have come a long way in the 160 years since the discoveries of chloroform and ether, science has relatively little knowledge of how **general anesthetics** alter consciousness and suppress pain awareness (Orser, 2007). Although anesthetized people appear to "go to sleep," general anesthesia is quite different from sleep. Anesthesia involves none of the REM and NREM stages associated with sleep, even though it induces these sleep-like components:

1. *Sedation* (greatly reduced arousal)
2. *Unconsciousness* (lack of awareness and responsiveness)

3. *Immobility* (temporary paralysis)

4. *Amnesia* (lack of recall for the period under the influence of the anesthetic)

Strangely, these four components of anesthesia seem to be independent of one another. For example, conscious patients often carry on lively conversations as they "go under"—yet they rarely have a memory of these events.

One tentative theory suggests that anesthetics interrupt the process by which different parts of the brain work together, or "synchronize," thereby preventing consciousness. They may do so by mimicking or enhancing the action of **GABA**, one of the brain's primary inhibitory **neurotransmitters**. In this respect, anesthetics may be just another group of psychoactive drugs that interfere with consciousness.

## Psychology Matters

## Dependence and Addiction

We have seen that psychoactive drugs alter the functioning of neurons in the brain and, as a consequence, temporarily change one's consciousness. The same may be true of the steroids used by some athletes (Adelson, 2005). Once in the brain, such drugs usually act on synapses to block or stimulate neural messages. In this way, drugs profoundly alter the brain's communication system, affecting perception, memory, mood, and behavior.



The line between substance use and abuse is easy to cross with addictive drugs, most of which act on the brain's "pleasure centers."

Significantly, a given dose of many psychoactive drugs has a weaker consciousness-altering effect with continued use. As a result, the user needs larger and larger dosages to achieve the same effect. This reduced effectiveness with repeated use of a drug is called **tolerance**. Hand-in-hand with tolerance goes **physical dependence**—a process in which the body adjusts to and comes to need the substance, in part because the production of neurotransmitters in the brain is affected by the frequent presence of the drug (Wickelgren, 1998c).

- A person with a physical dependence requires the drug in his or her body and may suffer unpleasant *withdrawal* symptoms if the drug is not present.

- Some scientists believe the desire to avoid withdrawal is as important as the pleasurable effects of drugs in producing *addiction* (Everitt & Robbins, 2005).

A person who develops tolerance to a highly addictive drug such as heroin becomes less sensitive to all sorts of natural reinforcers, including the pleasures of friendship, food, and everyday entertainment: The drug, in increasing dosages, becomes the only thing capable of providing pleasure (Helmuth, 2001a). **Addiction** is said to occur when the person continues to use a drug in the face of adverse effects on his or her health or life—often despite repeated attempts to stop.

Addiction is not all physical, however. When heroin addicts routinely "shoot up" in the same environment—say, in the bathroom—a *learned* response actually anticipates the drug and prepares the body for it. The result is that the addict can tolerate dosages that are larger than when drugs are injected at a novel location (Dingfelder, 2004b). Thus, overdoses may occur if the user attempts to shoot up with his or her "usual amount" in a novel location.

## Withdrawal

**Withdrawal** involves uncomfortable physical and mental symptoms that occur when drug use is discontinued. It can include physical trembling, perspiring, nausea, increased sensitivity to pain and, in the case of extreme alcohol withdrawal, even death. Although heroin and alcohol are the drugs that most commonly come to mind when we think of withdrawal symptoms, nicotine and caffeine, as well as certain sleeping pills and "tranquilizing" drugs, also cause unpleasant withdrawal symptoms.

Individuals may find themselves craving or hungering for a drug and its effects, even when they are not physically dependent—a condition known as **psychological dependence** or *psychological addiction.* This usually results from the powerfully rewarding effects they produce. Psychological dependence can occur with many drugs, including caffeine and nicotine, prescription medications, and over-the-counter drugs.

Addiction, whether biological or psychological, ultimately affects the brain (Nestler & Malenka, 2004). Consequently, in the view of many public health professionals, this makes both forms of addiction brain diseases (Leshner, 1997). On the other hand, the general public has been reluctant to view drug addicts as people who have an illness. Instead, the public often thinks of addicts as weak or bad individuals who should be punished (MacCoun, 1998).

**What difference does it make whether we label addiction a "disease"? What is your opinion?**

When addicts are seen as persons suffering from a disease, they are most logically placed in treatment programs. By contrast, when they are seen as persons with character

defects, addicts are sent to prison for punishment—which does little to break the cycle of drug use, crime, and addiction.

**Strange as it may seem, some experts argue that viewing addiction as a disease may also *interfere* with the effective treatment of drug addicts. How could this be? What do you think?**

The disease model of addiction, with its emphasis on biological causes and medical treatment, does little to deal with the social and economic contexts in which addictions develop. This may explain why psychologically based programs that treat alcohol abuse as a behavioral problem may work better than medically based programs (Miller & Brown, 1997).

Treatment programs have an especially poor record with heroin addicts who learned their habits on the streets of the United States. In contrast, treatment was more successful with the thousands of veterans who became addicted to the heroin readily available to troops during the Vietnam war. What made the difference? The addicted veterans did not remain in the environment where they had become addicted—which was the wartime culture of Vietnam. Instead, they returned home to an environment not usually supportive of a heroin habit. On the other hand, heroin users who become addicted at home tend to return, after treatment, to the same environment that originally led to their addiction.

Whether it be physical or psychological, a disease, or a character flaw, drug addiction poses many personal and social problems. Clearly, this is a field that has much room for new ideas and new research.

# Critical Thinking Applied: The Unconscious—Reconsidered

Are we all a "wolf in sheep's clothing," as suggested by this painting? Is it really true that a hidden, evil force lurks within the unconscious of all of us? What does science have to say about this question?

As we have seen, the term *unconscious* can have many meanings. In Freud's psychoanalytic theory, for example, powerful unconscious forces actively work to block (or *repress*) traumatic memories and destructive urges (Freud, 1925). If allowed to break through into consciousness, these would cause extreme anxiety, Freud taught. In this view, then, the unconscious mind serves as a mental dungeon where terrible needs and threatening memories can be kept "locked up" outside of awareness.

Freud's ideas captivated artists and writers in the Western world. For example, Joseph Conrad's novel *Heart of Darkness* tells the story of one man's internal and unconscious struggle with his evil desires for power, destruction, and death. Unconscious desires can be sexual, as well, said Freud. What else could account for the dubious success of the titillating stories splashed so obviously across the pages of the tabloids and on our newsfeeds every day?

Freud also taught that we "forget" anniversaries because we have unconscious reservations about the relationship. He said we choose mates who are, on an unconscious level, substitutes for our fathers and mothers. And he gave us the concept of the "Freudian slip," which one wag defined as "saying one thing when you really mean your mother."

Freud, then, placed the *ego*—the rational decision-maker part of the mind—at the center of consciousness. There, he said, it assumes the responsibility of keeping the sexual and aggressive forces of the unconscious in check.

But was he right? Or were Freud's ideas better as metaphors than as objective science?

## What Are the Critical Issues?

Freud's theory can explain almost anything—and in very compelling language. He portrayed a mind perpetually locked in an internal struggle against itself. And we can see evidence all around us of the sexual and aggressive urges that loomed so important in his theory: in advertising, video games, movies, politics, and the ways people fight and flirt. So the issue is not whether sexual and aggressive urges influence human behavior, but whether these urges operate as Freud suggested: primarily at an unconscious level and in a mind continually in conflict with itself.

## What Is the Source?

Without a doubt, Freud was a perceptive observer of people and a creative theorist, and his views have been enormously influential. But his genius and his influence don't necessarily make his views correct. For example, his seeming obsession with sex makes sense in the context of the rigid and "proper" culture of early-20th-century Europe, which frowned on public references to sexuality. (In some quarters, the term *leg* was considered inappropriate for mixed company.) From the perspective of 21st-century Europe and North America, however, with sexual content quite common in conversation and in the media, we have no reason to believe that sexual thoughts are mostly unconscious. If anything, many people seem consciously preoccupied with sex. This does not mean, of course, that the unconscious does not exist. But it does raise questions about the unconscious as Freud envisioned it.

## Could Bias Contaminate the Conclusion?

Given the cultural constraints of his time, we should consider whether the seething cauldron of sexual desire that was the Freudian unconscious might be the result of biases in Freud's thinking—biases produced by the sexually uptight culture of which he was a part. Anytime there exist strong feelings toward something, emotional bias is a risk. Freud may have also been guilty of *confirmation bias*, finding evidence of the unconscious everywhere: in dreams, forgetting, slips of the tongue and other everyday errors, developmental stages of childhood, and mental disorders.

## Does the Reasoning Avoid Common Fallacies?

Freud may have also committed a common logical fallacy known as *begging the question*, or assuming the very thing one is trying to prove. We suggest that Freud begs the question by assuming that unconscious conflict is the

cause of all the mental phenomena he describes—from forgetting an anniversary to a fear of dogs to having a dream about flying. Why is this a logical fallacy? Because Freud's argument is also an attempt to prove the existence of a conflicted unconscious. He even suggested that resistance to his arguments is evidence of the unconscious at work! Such arguments are sometimes called *circular reasoning*.

And for our part, as critical thinkers, we must be careful not to commit the fallacy often described as "throwing the baby out with the bath water." That is, even if we find fault with some of Freud's notions, we do not need to reject the concept of an unconscious altogether. In fact, the unconscious plays a huge role in our motivations and emotions.

### What Conclusions Can We Draw?

We can question Freud and still respect his brilliance and his stature. After all, he developed an amazingly comprehensive and appealing theory of mind in the early days of the 20th century—long before brain scans and other tools of modern psychology were available. Almost certainly, some of his ideas had to be erroneous in light of newer knowledge. The important question, then, is whether Freud's concept of consciousness and the unconscious mind is still reasonable in view of the evidence psychology has accumulated since Freud's time.

In recent years, techniques such as brain scans and priming have made it possible to probe unconscious thought processes in ways never dreamed of by Freud (Kihlstrom, 1990; Kihlstrom and others, 1992). In the resulting picture, the unconscious—although quite expansive, as Freud imagined—does not appear so sinister as Freud portrayed it. In fact, it may have a much simpler structure than the complicated censoring and repressing system that Freud proposed (Greenwald, 1992).

Brain scans do provide support for some of Freud's broad notions, such as the idea that many parts of the brain can operate outside of consciousness. What Freud didn't know is how much of this activity is devoted to simple background tasks, such as maintaining body temperature and controlling hunger and thirst. Likewise, the brain performs a sort of "preconscious" screening on the incoming stream of sights, sounds, smells, and textures. This screening also provides a quick-and-dirty appraisal of events for their attractiveness or harmfulness (LeDoux, 1996). Such processing can even save your life, as when you react "without thinking" to a swerving car coming at you.

Ironically, then, the cognitive view of an unconscious that monitors, sorts, discards, and stores the flood of data we encounter may give the unconscious an even larger role than Freud originally conceived. But it is not the picture of a scheming and plotting unconscious, full of sinister urges that must be vented (Baumeister, 2005; Wilson, 2002). Rather, the less-than-conscious mind seems to work, for the most part, in concert with consciousness, rather than against it.

# Summary: States of Consciousness

## Chapter Problem

How can psychologists objectively examine the worlds of dreaming and other subjective mental states?

- Brain scanning technologies such as EEG, PET, MRI, and fMRI help scientists study subjective mental states.
- Using these technologies, combined with other scientific methods such as experiments, researchers have learned much about the nature of sleep. Hypnosis and meditation have only recently begun to be studied scientifically, but early results show that these altered states of consciousness do produce some predictable changes in the brain.

- Psychoactive drugs also produce altered states of consciousness, which result from the effects of the particular drug on the brain's communication system and neurotransmitters.

## How Is Consciousness Related to Other Mental Processes?

### Core Concept 8.1

**The brain operates on many levels at once—both conscious and unconscious.**

**Consciousness** represents one of the major mysteries of psychology, both in its ordinary waking state and in its many *altered states*. Consciousness is a process linked to

working memory, learning, and attention. Behaviorists rejected consciousness as a topic too subjective for scientific study, but **cognitive neuroscience** shows that scientific methods can be applied to consciousness using both psychological techniques and brain scanning technology.

Psychologists have used various metaphors for consciousness. Freud likened consciousness to an iceberg, in which the **unconscious** played a powerful role in motivation. James spoke of a "stream of consciousness." The modern cognitive perspective uses a computer metaphor. In addition to consciousness, the mind has many **nonconscious** modes that can operate outside awareness. These include the **preconscious** and various levels of unconscious processing. While consciousness is limited to serial processing, the mind can process information nonconsciously in parallel channels.

Consciousness involves at least three important factors: restricted **attention**, widespread connections among diverse areas of the brain, and a mental model of the world used in thinking. Comas are short-term states that transition into either a *minimally conscious state* or a *persistent vegetative state*. Measuring consciousness in **coma** patients is difficult and sometimes erroneous but is improving with advanced brain scanning techniques, and new research finds that coma patients can often hear people talking to them, which can increase likelihood and pace of recovery.

Because consciousness is limited, students using their knowledge of consciousness can employ study methods that facilitate the passage of information from consciousness into long-term memory so that it remains accessible to consciousness. All such techniques involve making the material meaningful.

## What Cycles Occur in Everyday Consciousness?

### Core Concept 8.2

**Consciousness fluctuates in cycles that correspond to our biological rhythms and to patterns of stimulation in our environment.**

Consciousness shifts and changes in everyday life, commonly taking the form of daydreaming, sleep, and nocturnal dreams. **Daydreaming** is probably inevitable and is a function of the default status of the waking. Daydreaming can enhance problem solving and creative insight but can also interfere with memory and happiness.

Although the function of *sleep* is not altogether clear, everyone agrees that sleep and wakefulness are part of the **circadian rhythms**. Too little sleep incurs a **sleep debt**, which impairs mental functioning. Sleep researchers have revealed the features of the normal *sleep cycle,* including the four *stages of sleep,* as revealed by recordings of brain waves on the EEG. These sleep stages recur in 90-minute cycles,

featuring both **REM** and **non-REM** periods. Over the course of the night, each ensuing sleep cycle involves less deep sleep and more REM sleep. The sleep cycle also changes dramatically with age. Most adults need at least 8 hours of sleep every night.

The function of *dreams* is also unclear, but they often occur in REM sleep, accompanied by **sleep paralysis**. Dreams have, however, always been a source of inspiration and creativity for humankind in cultures around the world. Among theories of dreams, Freud's has been the most influential—although it has little empirical support. Studies show that dreams vary by culture, gender, and age. Many theories suggest dreams are meaningful events, and research shows they often involve problems of the previous day; **activation-synthesis theory** claims that dreams are essentially meaningless. Recent studies suggest that dreams may help in the consolidation of memory.

Abnormalities in the sleep cycle can produce various sleep disorders. **Narcolepsy** is a disorder of REM sleep, **insomnia** involves shortened sleep, and **sleep apnea** involves abnormalities in deep sleep. Other disorders of a less serious nature include **night terrors**, *sleep talking*, *bed wetting*, and *sleepwalking.*

## What Other Forms Can Consciousness Take?

### Core Concept 8.3

**An altered state of consciousness occurs when some aspect of normal consciousness is modified by mental, behavioral, or chemical means.**

*Altered states of consciousness* include hypnosis, meditation, and psychoactive drug states. **Hypnosis** remains especially puzzling as to whether it is a separate state of consciousness. Some scientists view it merely as a suggestible state; others see it as role playing or involving a "hidden observer." Cognitive psychologists have suggested it involves a shift in top-down processing. It is known to block pain, although it does not act like placebos. While hypnosis has many uses in therapy and research, one drawback is that not everyone can be deeply hypnotized.

**Meditation** has a long history in Asian and Pacific cultures but has only recently been studied by psychologists. Likewise, experts dispute whether meditation is a distinct state of consciousness, even though it has measurable effects on arousal and anxiety, as well as producing changes in brain waves, blood pressure, and stress hormones. Meditation has recently been found to improve brain functioning in several areas.

Most **psychoactive drugs** produce sensations of pleasure and well-being that make these drugs especially attractive and potentially addictive. **Hallucinogens** (such as cannabis, mescaline, psilocybin, LSD, and PCP) generally affect receptor sites for serotonin. Distinct receptor

sites for THC and for the **opiates** (including morphine, heroin, codeine, and methadone) suggest that the brain makes its own version of these substances. **Depressants** (including barbiturates, benzodiazepines, and alcohol) act to inhibit communication within the brain; many depressants are among the commonly abused drugs. Medically, **barbiturates** are often prescribed for their sleep-inducing properties, while **benzodiazepines** are used to treat anxiety. Most people use alcohol responsibly, although between 5% and 10% of American adults are problem drinkers. **Stimulants** (such as amphetamines, cocaine, and MDMA) are widely abused, although amphetamines are prescribed for ADHD. Caffeine and nicotine also act as stimulants. **General anesthetics** alter consciousness and suppress pain. Their effects are different from sleep. In general, they produce sedation, unconsciousness, immobility, and amnesia for events occurring during anesthesia.

Many psychoactive drugs can lead to **addiction**. One indication of this potential is increased **tolerance**; another is **physical dependence**, marked by **withdrawal symptoms**. Some drugs that are not physically addicting produce **psychological dependence**. Although addiction has been characterized as a *disease*, some psychologists believe that the disease model of addiction is shortsighted.

## Critical Thinking Applied: The Unconscious—Reconsidered

Over 150 years ago, Freud proposed a model of the unconscious that remains widely referenced today. Modern technologies show that the unconscious exists and, in fact, is possibly even more expansive than Freud imagined. On the other hand, these same technologies reveal our unconscious processes to be far less sinister than Freud theorized.

## Additional Video Resources

Here are two video resources we think you will find both interesting and of personal value to understanding states of consciousness.

**WATCH**  Sleep, Memory and Dreams

Harvard sleep researcher Bob Stickgold talks about how sleep fosters insight, discovers the rules of our lives, and makes sense of our experiences. Watch the video here: https://www.youtube.com/watch?v=WmRGNunPj3c

**WATCH**  The New Face of Heroin

Watch how heroin addiction affects people you might not expect here: https://www.youtube.com/watch?v=WmRGNunPj3c.

# Chapter 9
# Motivation and Emotion



Marcus Mariota, quarterback and Heisman trophy winner from the University of Oregon

---

## Core Concepts

**9.1** Motives are internal dispositions to act in certain ways, although they can be influenced by multiple factors, both internal and external.

**9.2** A new theory combining Maslow's hierarchy with evolutionary psychology solves some long-standing problems by suggesting that functional, proximal, and developmental factors set our motivational priorities.

**9.3** Although dissimilar in many respects, hunger and sex both have evolutionary origins, and both involve a combination of biological and social needs—but only one is necessary for survival of the individual.

**9.4** Emotions are a special class of motives that help us attend to and respond to important (usually external) situations and communicate our intentions to others.

Most success stories involve overcoming disappointment and adversity—and Marcus Mariota's is no exception. A good athlete in high school, he nevertheless languished on the bench for 3 years, in the shadow of another quarterback the coach judged to be more talented. Many times, his mother remembers, Marcus was on the verge of tears on the drive home from the game. Then, in his senior year, when finally allowed to play, Marcus led the Saint Louis High football team to the Hawaii state championship. He went on to become a standout quarterback at the University of

Oregon. But his success in college football—and later being drafted into the pros—was never was a sure thing.

> "It was hard," he recalls, "But I learned from it and it made me stronger" (Chapman, 2012).

Academics were the first obstacle. In grade school, he was such a poor reader that a teacher once considered holding him back. Discovering that he didn't know the sounds of letters, his parents had Marcus sound out the letters on license plates. It worked (Chapman, 2012; Rohan, 2014).

Mariota first began to blossom, both as a student and an athlete, at St. Louis High. Later, at Oregon, he often carried 20 credit hours, even during football season—allowing him to earn a degree in science in less than 4 years. With a B+ average. Not bad for a kid who almost had to repeat a grade.

We can't attribute all of Mariota's success to his parents and teachers. Marcus also had inner traits that helped him push through difficult times. He was always strongly goal-driven. When assigned to imagine his future in a fourth-grade essay, he laid out his intention to play high school football, move on to the University of Southern California, and then into the NFL (Chapman, 2012). Contrary to his prediction, though, he didn't end up at USC: the Trojans weren't interested enough to offer him a scholarship. The Oregon Ducks' coaches, however, saw his potential and made him an offer. Mariota repaid them by scoring 131 touchdowns, resulting in 35 wins and a berth in the national playoffs. Oh, and he garnered the first-ever Heisman trophy for an Oregon player and for the state of Hawaii. These accomplishments led to being drafted in the first round by the Tennessee Titans.

Mariota accomplished all this with a curious combination of characteristics for a leader: Predictably, he is highly competitive, and unruffled in tense situations—yet he is paradoxically soft-spoken, self-effacing, and even a little shy. Beloved by his teammates, Mariota seems to lead more by example than by the vocal "rah-rah" sort of encouragement more commonly found in team leaders. That mix of traits can make Mariota a difficult "read"—which turns out to be an advantage for a quarterback. "My (parents) are the only ones that really ever could understand my body language," he says (Fentress, 2012).

But those traits are mainly outward and behavioral, while *motivation* and *emotion*—the subjects of this chapter—also involve *internal* needs, drives, and feelings. So, what inner mental mechanisms might energize Mariota's intensely competitive spirit, long hours of practice, and study of the game—yet put the brakes on displays of emotion? We cannot, of course, observe his motives directly, but we can surmise that they involve some combination of nature and nurture—heredity and experience.

Marcus himself attributes his demeanor to experience: His parents, he says, taught him to be humble and reserved. His mother emphasizes inborn factors, saying, "He's always been like that. What you see is what you get"

(Chapman, 2012)—except, as his Aunt Vaosefa notes, "He is only outspoken when he's around family" (Chen, 2014).

Clearly, the Polynesian culture has also left its mark on Marcus Mariota. As teammates note, Mariota has "Hawaiian cool" (Chapman, 2012). Accepting the Heisman award, Mariota said, "In Hawaii, if one person is successful, the entire state is successful. To be a part of that, it's so special" (Rohan, 2014).

All of these factors—family, friends, heredity, culture, disappointments, successes, and honors—undoubtedly had their influence on Mariota's unusual combination of competitiveness and reserve. Uncharacteristically, however, Mariota's emotions came to the surface, as tears welled up during his Heisman acceptance speech. "This is the toughest part," he declared. He concluded with a message, in Samoan, to all in the room: *"Fa'afetai tele lava"* ["Thank you very much"] (Rohan, 2014).

> **CHAPTER PROBLEM: How can theories of motivation and emotion help us understand unusual and complex people, like Marcus Mariota, our family and friends . . . and, perhaps, even ourselves?**

# Key Question: What Motivates Us?

> **Core Concept 9.1**
>
> **Motives are internal dispositions to act in certain ways, although they can be influenced by multiple factors, both internal and external.**

In everyday conversation, we may refer to motivation with terms like drive, instinct, energy, purpose, goal, intensity, perseverance, desire, want, and need. You will note that all these words refer to internal psychological "forces" that presumably make us do what we do. But the fact that we cannot observe internal processes directly is what makes the psychology of motivation so challenging.

On the other hand, we don't think much about motivation when people act as we expect: getting up in the morning, answering the phone, stopping for red lights, greeting their friends, or going to class. But we *do* wonder what motivates people like your eccentric uncle who behaves badly at Thanksgiving dinner, or people who, like Mariota, achieve fame, fortune, or notoriety.

Yet another part of the problem of motivation involves motivating others. If you are an employer, you probably want to motivate your employees to work hard so the company can make money. If you are a coach, you want to motivate your players to train hard so the team can win. But let's bring it closer to home: As a student, you probably also want to learn how to motivate yourself to study a bit more, so you can get good grades.

So, how do we go about understanding and controlling motivation? Let's begin with the basics, by defining what we mean by the term *motivation.* As the core concept tells us:

> Motives are internal dispositions to act in certain ways, although they can be influenced by multiple factors, both internal and external.

More broadly, the concept of **motivation** refers to all the processes involved in:

(a) Sensing a need or desire

(b) Activating and guiding the organism by selecting, directing, and sustaining behavior aimed at meeting the need or desire; and finally,

(c) Reducing the sensation of need

Take thirst, for example: On a warm day, you may *sense a biological need* for fluids that causes you to feel thirsty. That feeling of thirst then arouses a motive that *focuses your behavior* on getting something to drink. When you have drunk your fill, the uncomfortable *sensation of thirst diminishes,* and the motive fades into the background.

Sometimes, of course, drinking is not a response to a physical need at all. So, denizens of a pub may drink beer not to quench their thirst but because they like the "buzz," because their friends are drinking, or because TV ads have primed them to associate drinking beer with fun. In any of these cases, the need is said to be a *psychological* rather than a *biological* need. In fact, many of our motives involve a complex combination of biological and **psychological needs**, especially those involving our social interactions, emotions, and goals. Take, for example, the motives that underlie work.

By the end of this section, you will be able to:

**9.1**    **Recall some of the factors that motivate us to work**

**9.2**    **Analyze how rewards affect motivation**

# 9.1:  Why People Work: McClelland's Theory

**Objective:   Recall some of the factors that motivate us to work**

Most people work to make money, of course, which buys things necessary for survival and a comfortable lifestyle. Psychologists refer to money and other incentives as external, or extrinsic, motivators, because they come from outside the person. In general, **extrinsic motivation** involves external stimuli that goad an organism to action. For students, grades are among the most powerful extrinsic motivators. Other examples include food, drink, praise, awards, and sex. The idea that work motivation is driven by extrinsic rewards is called the *reward theory.* But, as we saw with Marcus Mariota, it is too simple to account for all the reasons people strive to be successful at a task.

A more sophisticated view, known as **expectancy theory**, says that people feel motivated to work at tasks in which they *expect* to be successful and in which they value the results of their work—including both the things they produce and the rewards they receive (Grant & Shin, 2011).

People can also have **intrinsic motives** for working—motives that arise *within* them. You are intrinsically motivated when you enjoy meeting a new challenge on the job. More generally, intrinsic motivation involves engaging in an activity—work or play—for its own sake, regardless of an external reward or threat. As the Nike ad says, you "Just do it" because it meets a psychological need. In short, an intrinsically motivated activity is its own reward.

**So, how could we assess a person's motivation for work?** Psychologist David McClelland (1958) suspected that the stories people would tell to describe a series of ambiguous pictures could reveal their motives—using the *Thematic Apperception Test (TAT),* developed by Henry Murray (1938). You can see one such picture in Figure 9.1. Initially, McClelland rated people's stories for what he called the **need for achievement (***n Ach***)**, defined as the desire to attain a difficult, but desired, goal.

**Figure 9.1** Alternative Interpretations of an Ambiguous Picture



Story Showing High *n Ach*: The boy has just finished his violin lesson. He's happy at his progress and is beginning to believe that all his sacrifices have been worthwhile. To become a concert violinist, he will have to give up much of his social life and practice for many hours each day. Although he knows he could make more money by going into his father's business, he is more interested in being a great violinist and giving people joy with his music. He renews his personal commitment to do all it takes to make it.

Story Showing Low *n Ach*: The boy is holding his brother's violin and wishing he could play it. But he knows it isn't worth the time, energy, and money for lessons. He feels sorry for his brother, who has given up all the fun things in life to practice, practice, practice. It would be great to wake up one day and be a top-notch musician, but it doesn't happen that way. The reality is boring practice, no fun, and the likelihood that he'll become just another guy playing a musical instrument in a small-town band.

McClelland discovered that certain characteristics distinguish people with a high need for achievement. On the average, they work harder and become more successful at their work than those lower in achievement motivation. They also show more persistence on difficult tasks (McClelland, 1987b; Schultz & Schultz, 2006). In school, those with high *n Ach* tend to get better grades (Raynor, 1970), perhaps because they also tend to have higher IQ scores (Harris, 2004). In their career paths, they usually take more competitive jobs (McClelland, 1965), assume more leadership roles, and earn more rapid promotions (Andrews, 1967). If they go into business, they become more successful than those with low *n Ach* (McClelland, 1987a, 1993).

### 9.1.1: I/O Psychology: Putting Achievement Motivation in Perspective

Understanding and assessing worker motivation is the domain of industrial/organizational (I/O) psychologists, who find that not every good worker has a high need for achievement, nor does every job offer intrinsic challenges. Indeed, McClelland (1985) found at least two other psychological needs that induce people to work. For some, work meets a *need for affiliation,* while for others work satisfies a *need for power.* (The need for power should not necessarily be construed as negative but rather in the more positive sense of using authority to plan projects and manage people, to get a job done.) Given these three needs for work—achievement, affiliation, and power—it becomes the manager's task to structure jobs so that workers simultaneously meet their own needs as well as the manager's goal of productivity. (Managers, themselves, are usually motivated by a combination of achievement and power.)

Of course, people work for other reasons, beyond the needs for achievement, affiliation, and power. As we have said, work is a way to make a living and to achieve a desired lifestyle. But at least as important, work is wrapped up in our identity: We identify ourselves as teachers, surgeons, farmers, park rangers. . . . Here, however, we will focus on achievement, affiliation, and power, because those are the motives that I/O psychologists have found especially helpful in distinguishing the motivation of one worker from another.

Should you find yourself in a management position, here are some pointers you will find helpful from the research on motivating employees:

- **For those high in *n Ach,*** *give them challenging* tasks, with achievable goals. Even though high–*n Ach* employees are not primarily motivated by extrinsic rewards, they will appreciate bonuses, praise, and recognition given as feedback for good performance.

- **For those high in the need for *affiliation***, a cooperative, rather than competitive, environment is best. Find opportunities for these employees to work with others in teams, rather than at socially isolated workstations.

- **For those high in *power***, give them the opportunity to manage projects or lead work teams. You can encourage power-oriented workers to become leaders who help their subordinates satisfy their own needs. Again—although power motivation *can* be purely self-serving—don't misunderstand the need for power as necessarily bad.

Satisfying people's needs should make them more satisfied with their jobs and more motivated to work.

**But does job satisfaction actually lead to better employee performance?** Studies show that higher job satisfaction indeed correlates with lower absenteeism, lower employee turnover, and increased productivity—all of which are reflected in increased profits for any business (Schultz & Schultz, 2006).

### 9.1.2: A Cross-Cultural View of Achievement

Is the need for achievement the same around the world? Let's examine two instructive cases in point.



When American swimmer Misty Hyman won the Olympic gold medal in the women's 200-meter butterfly, she said:

> I think I just stayed focused. It was time to show the world what I could do. I am just glad I was able to do it. I knew I could beat Suzy O'Neil, deep down in my heart I believed it, and I know this whole week the doubts kept creeping in, they were with me on the blocks, but I just said, "No, this is my night" (Neal, 2000).

Contrast that with Japanese runner Naoko Takahashi's explanation of why she won the women's marathon:

> Here is the best coach in the world, the best manager in the world, and all of the people who support me—all of these things were getting together and became a gold medal. So I think I didn't get it alone, not only by myself (Yamamoto, 2000).

The American's perspective on achievement motivation reflects a distinctively Western bias. Americans tend to see achievement as the result of individual talent, determination, intelligence, or attitude. Much of the world, however, sees achievement differently—in a broader context, as a combination of personal, social, and emotional factors (Markus and others, 2006).

This observation fits Harry Triandis's (1990) distinction between cultures that emphasize individualism or collectivism. Western cultures, including most of the United States, Canada, Britain, and Western Europe, emphasize **individualism**. People growing up in these environments learn to place a premium on individual performance. In contrast, says Triandis, the cultures of Latin America, Asia, Africa, the Pacific Islands, and the Middle East often emphasize **collectivism**, which values group loyalty and subordination of self to the group. Even in the collectivist cultures of Japan, Hong Kong, and South Korea, where high values are placed on doing well in school and business, the overarching goal is not achieving individual honors but bringing honor to the family, team, or other group. Without a cross-cultural perspective, it would be easy for many Americans to jump to the erroneous conclusion that motivation for individual achievement is a "natural" part of the human makeup. But Triandis's insight suggests that a need for individual achievement is far from universal. (So, which cultural perspective would you attribute to Marcus Mariota?)

# 9.2: The Unexpected Effects of Rewards on Motivation

**Objective:**   **Analyze how rewards affect motivation**

We have suggested that extrinsic rewards, such as recognition, praise, and money, are among the reasons people work. But what do you suppose would happen if people were given *extrinsic* rewards for doing things that they find *intrinsically* enjoyable?

## 9.2.1:  Overjustification

To find out, Mark Lepper and his colleagues (1973) performed a classic experiment using two groups of schoolchildren who enjoyed drawing pictures. One group agreed to draw pictures for a reward certificate, while a control group made drawings without any expectation of reward. Both groups pursued the task enthusiastically. Some days later, however, when given the opportunity to draw pictures again, without a reward, the previously rewarded children were much *less* enthusiastic about drawing than those who had not been rewarded, while the group that had received no rewards was actually *more* interested in drawing than they had been the first time!

Lepper's group concluded that external reinforcement had squelched the internal motivation in the reward group, an effect they called **overjustification**. As a result of external and unneeded reward for drawing pictures, they reasoned, the children's motivation had switched from intrinsic to extrinsic, making the children less interested in drawing pictures without reward. In brief, a reward can sometimes take the fun out of doing something for the sheer pleasure of it.

- But do rewards *always* produce this overjustification effect?
- If they did, how could we explain the fact that many professionals both love their work and get paid for it?

Subsequent experiments have made it clear that rewards can interfere with intrinsic motivation, but only under certain conditions (Covington, 2000; Eisenberger & Cameron, 1996). Specifically, the overjustification effect occurs when a reward is given *without regard for quality of performance.* This explains what happened to the children who were given certificates for their drawings. The same thing can happen in the business world when employees are given year-end bonuses regardless of their productivity or in the classroom when all students routinely get As.

The lesson is this:

> Rewards can be used effectively to motivate people—but only if the rewards are given for a job well done, contingent on quality of performance, not as a bribe.

In general, rewards can have three major effects on motivation, depending on the conditions:

- Rewards can be an effective way of motivating people *to do things they would not otherwise want to do*—such as mowing the lawn or taking out the garbage.
- Rewards can add to intrinsic motivation, *if given for good performance.*
- And, as we have also seen, rewards can *interfere* with intrinsic motivation, *if given without regard for the quality of the work*—as Lepper's group showed.

So, if a child doesn't like to practice the piano, wash the dishes, or do homework, no amount of reward is going to change her attitude. On the other hand, if she enjoys piano practice, you can feel free to give praise or a special treat for a job well done. Such rewards can make a motivated person even more motivated. Similarly, if you have uninterested employees, don't bother trying to motivate them with pay raises (unless, of course, the reason they're unmotivated is that you are paying them poorly). But when it is deserved, impromptu praise, an unexpected award, or some other small recognition may make good employees perform even better.

So, how do you think college professors should reward students in order to encourage their best work?

---

### Psychology Matters

## Using Psychology to Learn Psychology

The world's greatest achievements in music, art, science, and business usually come from intrinsically motivated people pursuing ideas or goals in which they are deeply interested. The same goes for athletes, like Mariota. People enter this state of mind when absorbed by some problem or activity that makes them lose track of time and become oblivious to events around them. Psychologist Mihaly Csikszentmihalyi (1990, 1998) uses the term **flow** for this special state of mind. Although some people turn to drugs or alcohol to experience an artificial flow feeling, meaningful work produces far more satisfying and sustained flow experiences.

***What is the connection with studying and learning?*** If you find yourself lacking in motivation to learn the material for a particular class, the extrinsic promise of eventual good grades may not be enough to prod you to study effectively tonight.

But you may be able to trick yourself into developing intrinsic motivation and flow by posing this question: What do people who are specialists in this field find especially interesting?

Usually it's an unsolved mystery, a theoretical dispute, or the possibility of an exciting practical application. A psychologist, for example, might wonder: What motivates violent behavior? Or, how can we increase people's motivation to achieve? Once you find such an issue, try to discover what solutions have been proposed. In this way, you will share the mindset of those who are leaders in the field. And—who knows?—perhaps you will enter a flow state, too.

---

# Key Question: How Are Our Motivational Priorities Determined?

> **Core Concept 9.2**
>
> **A new theory combining Maslow's hierarchy with evolutionary psychology solves some long-standing problems by suggesting that functional, proximal, and developmental factors set our motivational priorities.**

Imagine it is late at night and you are vaguely hungry. You know that you need to study for a test, but you are getting sleepy. Suddenly your phone signals that you have a text message. How do you respond to these mixed motivational messages?

Psychologists have long puzzled over how we deal with competing motives, but until recently psychology had no theory that accounted for the whole range of human motives—and especially how we deal with conflicting or competing motives. As we will see, Abraham Maslow famously proposed such a theory, but although useful, it is flawed. But now as we understand from the core concept for this section, a new contender has emerged that, many psychologists say, may be able to do it all: a motivational "theory of everything."

> A new theory combining Maslow's hierarchy with evolutionary psychology solves some long-standing problems by suggesting that functional, proximal, and developmental factors set our motivational priorities.

We begin this story with a look back at theories past, on which this new theory was built.

By the end of this section, you will be able to:

**9.3** Summarize instinct theory, drive theory, and psychodynamic theory

**9.4** Explain Maslow's hierarchy of needs and why he developed it. How did Kenrick and his colleagues seek to improve it?

# 9.3: Instinct Theory, Drive Theory, and Freud's Psychodynamic Theory

**Objective:** Summarize instinct theory, drive theory, and psychodynamic theory

Since the days of William James, psychologists have realized that all creatures, humans included, possess an inborn set of behaviors that promotes survival. According to **instinct theory**, these built-in behaviors account reasonably well for the regular cycles of animal behavior that are found in essentially the same form across a species. We see these instinctive cycles in bird migrations, in the mating rituals of antelope, and in the return of salmon to the streams in which they were hatched only to spawn and die after a journey of more than 1,000 miles.

So-called instinctive behaviors depend more heavily on genetics than on learning, although experience can modify them. Thus, we see a combination of instinctive behavior and learning when bees communicate the location of food to each other or a mother cat helps her kittens hone their hunting skills. Such examples show that instincts involve a lot of **nature** and a little **nurture**.

Because the term *instinct* seemed to explain so much, it migrated quickly from scientific vocabulary into everyday speech, where it lost much of its meaning. We now speak casually of "maternal instincts," or of an athlete who "instinctively catches the ball," or of a talent scout who has an "instinct" for picking promising new performers. In fact, we use the term in so many ways that it has become a mere label, rather than an explanation for behavior.

As a result, the term *instinct* has long since dropped out of favor among scientists (Deckers, 2001). Ethologists, who study animal behavior in natural habitats, now prefer the term **fixed-action patterns**, more narrowly defined as innate behavior patterns that are triggered by identifiable stimuli and that occur throughout a species. Examples of fixed-action patterns include not only the "instinctive" behaviors we have described but also such diverse behaviors as nest building in birds, suckling responses in newborn mammals, and dominance displays in chimps and baboons.

*Do instincts—perhaps in their new guise as fixed-action patterns—explain human behavior?* Biology *does* seem to account for some human behaviors, such as crying and nursing, that we see in newborns. But instincts or fixed-action patterns are not very useful in explaining the complex behaviors found in older children and adults. For example, it is no more helpful to explain the motivation of a hard-driving executive as a "killer instinct" than to attribute Marcus Mariota's success to a "football instinct."

## 9.3.1: Drive Theory

The concept of drive originated as an alternative to instinct for explaining biologically based behavior that depends on the organism's internal state, as in eating and drinking. (For a comparison of the instinct and drive theories, see Table 9.1.) Psychologists defined a **biological drive** as the state of energy or tension that moves an organism to meet a biological need (Woodworth, 1918). Thus, thirst drives an animal in need of water to drink. Likewise, a need for food arouses hunger that drives an organism to eat. So, in **drive theory**, a biological **need** produces a **drive state** that, in turn, channels behavior toward meeting the need. When the need is satisfied, drive level subsides—a process called *drive reduction.* You have experienced drive reduction when you feel satisfied after a meal.



According to drive theory, a need for fluids motivates (drives) us to drink. A homeostatic balance is reached when the need is satisfied.

According to drive theory, what organisms seek is a balanced condition in the body, known as **homeostasis** (Hull, 1943, 1952). So, creatures that have an *un*balanced condition (caused, say, by lack of fluids) are driven to seek a homeostatic balance (by drinking). Similarly, we can understand hunger as an imbalance in the body's energy supply. It is this imbalance that drives, or motivates, a food-deprived animal to eat in order to restore a condition of equilibrium.

Unfortunately for drive theory, the whole story of motivation has proved not to be that simple. It worked well in explaining animal behavior, but it faltered as an explanation for psychological motives and goals, found in humans—motives like the need for achievement. Moreover, drive theory cannot explain why, in the absence of any apparent deprivation or obvious needs, organisms sometimes act merely to *increase* stimulation. It is hard to imagine, for example, a basic need or a biological drive that could prompt people to go skiing or jump out of airplanes. Nor will biological drives explain why laboratory rats will

cross an electrified grid merely to reach a novel environment to explore. Or why Mariota loves to play football. Psychologists call these *psychological motives.* In contrast to biological drives, psychological motives serve no immediate biological need but, rather, are strongly rooted in learning, incentives, threats, or social and cultural pressures.

Thus, we see that drive theory holds some—but not all—answers to the riddle of motivation. As a result, psychologists have been reluctant to abandon the concept of drive, which has come to mean a biologically based motive that plays an important role in survival or reproduction.

## 9.3.2: Freud's Psychodynamic Theory

Just before the turn of the 20th century, young Sigmund Freud announced his own views of motivation, which were a curious combination of the old instinct theory, Darwin's then-new ideas about evolution, and the sexual prudishness of 19th-century Europe.

Attempting to explain the origin of mental illness, Freud proposed that most human motivation stems from the murky depths of the unconscious mind, which he called the *id.* There, he said, lurked two basic desires that we must control: *eros,* our erotic desires, and *thanatos,* the aggressive or destructive impulse.

Virtually everything we do, said Freud, is based either on one of these two urges or on the unconscious tricks that the mind uses to keep these dangerous desires in check. Much like a boiler with a growing head of steam, we need acceptable outlets for our mounting sexual and aggressive impulses. Freud believed that work, especially creative work, drew off some of the pressure. In his theory, mildly aggressive acts like swearing and shouting—or playing competitive games—serve as a psychologically satisfying outlet for our deeper destructive tendencies. (No wonder Mariota is a likeable young man, Freud would have said!)

It is important to remember that Freud developed his ideas in the heyday of instinct theory, so eros and thanatos are often thought of as instincts. But it would oversimplify Freud's theory to think of it as just another instinct theory. (See Table 9.1.) He wasn't trying to explain the biologically based drives of hunger or thirst. Rather, he sought to explain the symptoms of mental disorders, such as phobias and depression.

While most psychologists these days don't buy all of Freud's ideas, many would agree with him that much mental activity, including motivational and emotional processes, *does* occur outside of consciousness (Bornstein, 2001; Westen, 1998). Most would also broadly agree with his *developmental* approach to motivation; that is, with Freud's idea that our motives undergo change as we move from childhood to adulthood.

# 9.4: Maslow's Hierarchy of Needs

**Objective:** Explain Maslow's hierarchy of needs and why he developed it. How did Kenrick and his colleagues seek to improve it?

What happens when you must choose between meeting a biological need and a psychological motive—as when you choose between sleeping and staying up all night to study for an exam? Abraham Maslow (1970) said that we usually act on our most pressing needs, which occur in a natural *hierarchy* or priority order, with biological needs taking precedence. Like Freud, Maslow attempted to explain the whole gamut of human motivation from biological drives to social motives to creativity (Nicholson, 2007). Unlike Freud, however, Maslow didn't believe that our real motives were unconscious, nor did he believe that our motives were as negative and sinister as the sexual and aggressive drives Freud had proposed.

Maslow's important innovation, then, was his **hierarchy of needs**, which posited five classes of needs arranged in priority order (see Figure 9.2 and Table 9.1), with the "higher" needs coming into play only when the more basic needs are satisfied:

- *Biological needs,* such as hunger and thirst, lie at the base of the hierarchy and take precedence over all other needs.
- *Safety needs* motivate us to avoid danger, but only when biological needs are reasonably well satisfied. Thus, a hungry animal may risk its physical safety for food until it gets its belly full, at which point the safety needs take priority.
- *Love, attachment, and affiliation needs* energize us when we are no longer concerned about the more basic drives such as hunger, thirst, and safety. These needs draw us into social relationships with others.
- *Esteem needs* follow next in the hierarchy, including the needs to respect oneself, to see oneself as competent and effective, and to do what is necessary to earn the respect of others.

**Figure 9.2** Maslow's Hierarchy of Needs

- *Self-actualization* motivates us to seek the fullest development of our creative human potential. Self-actualizing persons are self-aware, self-accepting, socially responsive, spontaneous, and open to novelty and challenge.

- *Transcendence,* the "highest" need, but with the lowest priority, motivates us to seek further some cause beyond the self (Koltko-Rivera, 2006). Satisfying this need, he said, could involve anything from volunteer work to absorption in religion, politics, music, or an intellectual pursuit.

Cross-cultural psychologists criticized Maslow's theory and other "self theories," noting that an emphasis on self-actualization applies primarily to individualistic cultures, which emphasize individual achievement (Gambrel & Cianci, 2003). In contrast, group-oriented (collectivistic) cultures emphasize success of the group, rather than *self*-actualization (Shiraev & Levy, 2006). In fairness to Maslow, however, we note that he did recognize that there are cultural differences in motivation (Maslow, 1943).

**How does Maslow's theory square with observation?**

It explains why we may neglect our friends or our career goals in favor of meeting pressing biological needs signaled by pain, hunger, thirst, or sleepiness. Yet we all know of people who neglect their basic biological needs in favor of higher ones, as in a writer in a "**flow**" state, who forgets to eat, or a father who risks his life to rescue his child from a burning bedroom. Maslow's theory also fails to explain why "sensation seekers" would pursue risky interests that override their safety needs (Think: rock climbing or sky diving). Neither can Maslow's theory explain the motivation of people who deliberately take their own lives.

## 9.4.1:  Putting It All Together: A New Hierarchy of Needs

*In the face of such criticism, what can we find in Maslow's theory worth saving?*

Douglas Kenrick and his colleagues (2010) agree that the idea of a *motivational hierarchy* was Maslow's great insight. But its major difficulty is that our motivational priorities are not rigidly fixed, but can change according to the circumstances we face. The solution, said Kenrick's group, is to understand that that we must view the needs hierarchy as fluid—subject to change by three kinds of influences that they label the *functional*, *proximal*, and *developmental levels of analysis* (See Figure 9.3).

- The **functional level of analysis** looks at the *function* of a motive, which (from an evolutionary perspective) relates to survival and reproductive success. Functional influences arrange our motives in a "default" hierarchy, grounded in the basic biological needs, much as Maslow envisioned. These needs motivate us

to seek food, drink, warmth, and shelter, without which we could not live. Similarly, sexual motivation arises from the evolutionary mandate to propagate one's genes into future generations. This need for sexual gratification and reproduction, then, gives rise to a whole range of *social* needs, including not only the physical urge for sex but also needs for affiliation, esteem, and parenting. As in Maslow's hierarchy, these reproductive needs, however, generally have lower priority than the survival needs.

- *Proximal* means "nearby," so the **proximal level of analysis** focuses on immediate events, objects, incentives, and threats that modulate our motivational priorities; that is, on *extrinsic* motives. For example, an interesting TV program is a proximal stimulus that can make you delay your bedtime, even though you are sleepy. In general terms, then, an important *proximal* stimulus can activate a temporary rearrangement in your default motivational hierarchy.

- As Freud taught us, one's motivational profile changes with age. When you were a baby, hunger, thirst, and contact comfort were your main concerns, but you gave nary a thought to reproduction or to the esteem of your peers. Then you became a teenager, and sexual motives, plus the need for social acceptance, likely began to occupy a dominant place in your needs hierarchy. And as you mature, the needs to learn, create, and contribute may assume increasing importance. Accordingly, the new motivational hierarchy adds a **developmental level of analysis** to emphasize these motivational realignments across the life span.

Critics have raised objections to the new motivational hierarchy, as we might expect (Ackerman & Bargh, 2010;

**Figure 9.3** Evolutionary Psychology's Revision of Maslow's Hierarchy

The new hierarchy of needs is based on the idea that all our motives are based on the needs for survival and propagation of our genes (or those of our kin) into future generations. The new theory also recognizes that our motivational priorities are not rigidly fixed, because of developmental changes and because of changing events in our lives (proximal stimuli).



Mating and Parenting

Esteem (respect) and status

Love (affection, belongingness), attachment, affiliation

Safety and self-protection

Immediate Physiological Needs

Proximal Stimulus or Developmental Change shifts motivational emphasis to a new level in the hierarchy.

Kesebir and others, 2010; Lyubomirsky & Boehm, 2010). In the opinion of your authors, Kenrick's group may have overlooked the possibility that "higher" motives—the *intrinsic motives*—including a need to be creative or to satisfy one's curiosity, may have become independent of their evolutionary roots. Certainly, creative persons—famous entertainers, for example—have an advantage in the mating game. Nevertheless, evolution may also have wired these motives independently in the brain, because having people with these motives may confer an advantage on the group.

## 9.4.2: Where Does All This Leave Us?

An emerging consensus on a few ideas may bring some unity to the psychology of motivation at long last (Schaller and others, 2010). We think that most psychologists would agree with the following points:

- Our motives have a "default" hierarchy or priority order that is essentially the same from person to person—much as Maslow described.
- This default hierarchy of motives must be understood in an evolutionary context, with the most basic motives being related to survival, followed by motives related to reproduction and to survival of offspring.
- An individual's motivational hierarchy is not rigid but can be influenced by proximal stimuli and by the person's developmental level.

As we have noted, there remains some disagreement as to whether the "higher" motives (such as creativity) are always based on the reproductive urge or can, instead, become independent *intrinsic* motives.

What this new hybrid approach to motivation does for us, then, is to bring together Maslow's hierarchy, Freud's **theory of psychosexual stages**, and evolutionary psychology to make a big tent that can encompass motives of all

sorts—from hunger and thirst to affiliation, status, and creativity. We still don't know precisely how the brain actually arranges and rearranges the motivational hierarchy, but at last we may have a framework within which the theoretical details can be worked out.

---

**Psychology Matters**

## Determining What Motivates Others

*Where do you start when you want to know what motivates a person's behavior—perhaps a friend who has been behaving oddly?*

We suggest caution before deciding that the source is some fixed personality trait. Instead, we recommend first looking for any external incentives or threats—extrinsic (proximal) motivators—that might be at work. Many times, these will tell the whole story.

Beyond that, we suggest you consider social motivation. While Maslow emphasized social motives in his hierarchy of needs, he wasn't the first to suggest their importance in human behavior. Alfred Adler, a contemporary of Sigmund Freud, was arguably the first social psychologist (Ansbacher & Ansbacher, 1956). Adler taught that problem behavior often grows out of feelings of personal inadequacy and perceived social threats. The counterbalancing trend in the healthy personality is a goal or need for cooperation and the desire for acceptance by others. He called this "*social interest*." Modern social psychologists combine the notions of social motivation with extrinsic incentives and threats in what they call the "power of the situation."

Adler's ideas are much more complex than we can detail here. Suffice it to say that a person who feels threatened may respond defensively, with annoying behavior or unexpected aggressiveness. If you are that person's parent, teacher, employer, or friend, the trick is not to respond in kind. Don't give attention to an attention-getter. Don't respond aggressively to an aggressor. Don't try to "get even" with a vengeful person. And don't smother a withdrawn individual with pity. Instead, treat the person with respect—and try to understand the social motives behind the behavior.

---

**Table 9.1** Theories of Motivation Compared

| Theories | Emphasis | Examples |
| --- | --- | --- |
| **Instinct Theory** | Biological processes that motivate behavior patterns specific to a species | Bird migration, fish schooling |
| **Drive Theory** | Needs produce drives that motivate behavior until drives are reduced | Hunger, thirst |
| **Freud's Theory** | Motivation arises from unconscious desires; developmental changes in these urges appear as we mature | Sex, aggression |
| **Maslow's Theory** | Motives result from needs, which occur in a priority order (a needs hierarchy) | Esteem needs, self-actualization |
| **Evolutionary Theory** | Priority of motives determined by functional, proximal, and developmental factors—all of which arise from needs for survival and reproduction | Food odor (proximal stimulus) may raise the priority of hunger drive |

---

# Key Question: Where Do Hunger and Sex Fit into the Motivational Hierarchy?

**Core Concept 9.3**

**Although dissimilar in many respects, hunger and sex both have evolutionary origins, and both involve a combination of biological and social needs—but only one is necessary for survival of the individual.**

In this section of the chapter, we will compare and contrast two motives that represent the twin forces that evolution has used to shape the human species: the drives to *survive* and *reproduce*. Everyone reading this text has inherited the genes of ancestors who managed to do both. Ultimately, our task is to show how an evolutionary new perspective on motivation manages to bring both of these motives together under one theoretical umbrella. Let's consider the core concept for which this section is organized:

> Although dissimilar in many respects, hunger and sex both have evolutionary origins, and both involve a combination of biological and social needs—but only one is necessary for survival of the individual.

By the end of this section, you will be able to:

**9.5**  Describe the biological, social, and cognitive foundations of hunger

**9.6**  Explain why psychologists prefer terms such as *impulse control*, or *emotional control* to "will power"

**9.7**  Explain how is the sex drive different from hunger and thirst (other than the behavior involved). Explain also the major concepts about sex advanced by Kinsey, Masters and Johnson, Peplau, and the evolutionary psychologists

**9.8**  Explain the relationship between sex and hunger

# 9.5:  Hunger: A Homeostatic Drive *and* a Psychological Motive

**Objective:**  Describe the biological, social, and cognitive foundations of hunger

You will survive if you don't have sex, but you will surely die if you don't eat. Unlike sex, the hunger drive is one of several survival motives (Rozin, 1996). When food is available, the hunger drive leads quite naturally to eating. Yet there is more to hunger than biology: It has social and cognitive foundations, too, as we will see in our discussion of the multiple-systems approach to hunger and weight control.

## 9.5.1:  The Multiple-Systems Approach to Hunger

You feel hungry when your brain combines biological and psychological information of many kinds. These include your body's energy requirements and nutritional state, your food preferences, the food cues in your environment, and cultural demands. For example, your desire to eat a slice of bacon depends on factors such as your blood sugar level, how long it has been since you last ate, whether you like bacon, what time of day it is (breakfast?), whether a friend might be offering you a slice, and whether bacon is an acceptable or forbidden food in your culture. Assembling all these data, the brain sends signals to neural, hormonal, organ, and muscle systems to start or stop bacon seeking and eating (DeAngelis, 2004b; Flier & Maratos-Flier, 2007). As you may have surmised, the multiple-systems approach is another way of saying that hunger operates at many levels of the motivational hierarchy (see Figure 9.4).

## 9.5.2:  Biological Factors Affecting Hunger and Eating

In the brain, the stomach, the blood, and fat cells stored all over the body, a host of biological factors work in concert to regulate hunger and eating behavior. Among the most important are these:

- **Sensing biological needs.** Acting as an internal "biological laboratory," the hypothalamus continually monitors the blood for nutrients, water, and temperature (among other things). In doing so, it senses our need for food and regulates our hunger drive. But the hypothalamus does not operate alone. Other regions, particularly in the brain stem and the digestive tract, work with the hypothalamus to monitor the status of sugar and other nutrients in the gut, as well as fat stores all over the body, using a suite of receptors and chemical messengers (Flier, 2006).

- **Maintaining the homeostatic set point.** Whenever nutrients and fat deposits fall below a certain level, receptor cells in the brain and around the body send signals to the brain, arousing the hunger motive. Eating ensues, returning the level of nutrients and body fat to a homeostatic **set point**. Studies show that the hormone *ghrelin* has an especially important role in signaling hunger, while another hormone, *leptin*, signals satiation, when the set point has been reached (Grimm, 2007).

- **Reward system preferences.** In most people, the brain's reward system is set to prefer sweet and high-fat foods. These preferences evolved to steer our ancestors toward calorie-dense foods, enabling them to survive when food supplies were unpredictable. The bad news is that this tendency has been exploited in modern times by the manufacturers of sweet and fatty "junk foods," with little nutritional value.

- **Exercise.** Physical activity also contributes to hunger and satiation. Extreme exercise provokes hunger, but studies show that moderate exercise actually suppresses appetite (Hill & Peters, 1998).

- **Sleep.** Getting insufficient sleep can give you a case of the "munchies," whereby you eat and gain weight—possibly because the body mistakes sleepiness for hunger (Hasler and others, 2004; Nedeltcheva and others, 2009).

- **Bacteria in the gut.** Recent studies in mice suggest that differences between the microbe colonies in the digestive tract account for differences in body weight: When mice in those studies received gut bacteria transplanted from obese humans, the mice gained weight, whereas bacteria from lean people did not trigger weight gain (Ridaura and others, 2013).

All these biological hunger mechanisms operate at the most basic level of the needs hierarchy. But, as we have noted, hunger is not just a biological drive. Hunger is also a psychological motive that depends on one's emotional state and on the environment.

### 9.5.3: Psychological Factors Affecting Hunger and Eating

Some people respond to depression or boredom by eating more; some by eating less. The point is that emotional motives can affect hunger and eating. So can other motives, such as **flow**, sexual arousal, or the desire to hang out with friends.

Learning plays a role in hunger, too. We associate certain situations with food, so we may feel hungry simply because the clock says lunchtime. Learning also explains why you have an urge to snack while watching TV or to dish up a second helping at Thanksgiving dinner.

Nor should we forget the influence of culture on hunger and eating. In Oceania, where larger figures are often considered more attractive, social norms promote hefty bodies (Newman, 2004). Meanwhile, residents of the United States get a more mixed message: While the ideal promoted in movies, magazines, and on TV is one of thinness, Americans receive a different message from commercials that encourage eating cheap, tasty junk food. The result is a growing obesity problem in a population obsessed with weight. Moreover, as the influence of U.S. culture becomes more global, American eating habits have become more universal. The result is that calorie-dense snacks and fast foods are making people fatter all over the world (Hébert, 2005; Popkin, 2007).

---

**WRITING PROMPT**

**Weight Control and the New Needs Hierarchy**

Maintaining a healthy weight can be seen both as a sensible goal and a long-term survival need. What are some of the *proximal stimuli* that can work against that goal?

▶ | The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

### 9.5.4: Eating Disorders

Many people struggle with hunger, overeating, and obesity, but some struggle with the opposite problem: a persistent lack of appetite and morbid weight loss that characterizes

---

**Figure 9.4** Multiple-Systems Model of Hunger and Eating

the condition known as *anorexia.* Sometimes the condition results from a physical disorder, but more commonly, the cause has psychological roots—in which case the syndrome is called **anorexia nervosa**. "Nervous anorexia" typically manifests itself in extreme dieting and life-threatening weight loss. It is a serious disorder—so serious, in fact, that anorexia nervosa is responsible for the highest mortality rate of any psychological condition (Agras and others, 2004; Park, 2007). In the following discussion, we will revert to common usage by calling the disorder simply "anorexia."

**WHAT QUALIFIES AS ANOREXIA?**    When a person lacks appetite or refuses to eat, weighs less than 85% of her desirable weight, and worries obsessively about being fat, anorexia is the likely diagnosis. In addition, people with anorexia may suffer from a related problem called *bulimia* or **bulimia nervosa**, characterized by periods of binge eating followed by drastic "purging" measures, which might include vomiting, fasting, or using laxatives. In many cases, depression and **obsessive–compulsive disorder** further complicate the clinical picture.

Commonly, persons with anorexia act as though they were unaware of their condition and continue dieting, ignoring other danger signs that could include cessation of menstruation, osteoporosis, bone fractures, and shrinkage of brain tissue. Over time, bulimic vomiting, done to purge the food they have eaten, results in damage to the esophagus, throat, and teeth caused by stomach acid.

**WHAT CAUSES ANOREXIA AND BULIMIA?**    A strong clue comes from the fact that most persons with these disorders are young women—although it seems to be on the rise in young men (Smink and others, 2012). We caution readers that statistics on the incidence of these disorders vary wildly in different surveys, depending on the sample and on the criteria used to define the disorders. There is agreement, however, that most individuals with anorexia and bulimia live in Western cultures and come from middle- and upper-middle-class families (Striegel-Moore & Bulik, 2007). Clearly, these are disorders based more in culture than in hunger or lack of food resources.

Persons with anorexia commonly have histories of exemplary behavior, as well as academic and social success—but they nevertheless starve themselves, hoping to become more acceptably thin and attractive (Keel & Klump, 2003). In an effort to lose imagined "excess" weight, the anorexia sufferer suppresses her appetite. She may find reward for her self-control in losing pounds and inches—but never feels quite thin enough (see Figure 9.5).

This was shown in a striking study by April Fallon and Paul Rozin (1985), who asked female college students to give their current weight, their ideal weight, and the weight they believed men would consider ideal. The average woman respondent felt that her current weight was significantly higher than her ideal weight—and higher than the weight she thought men would like. Further, other research has shown that women also see their bodies as looking larger than they actually are (Thompson, 1986). When men were asked to rate themselves on a similar questionnaire, Fallon and Rozin found no such discrepancies between ideal and actual weights. But, when asked what they saw as the ideal weight for women, they chose a higher weight than women did. No wonder women go on diets more often than men and are more likely to have a major eating disorder (Mintz & Betz, 1986; Striegel-Moore and others, 1993).

**Figure 9.5**  Women's Body Images

Men and women have very different ideas of ideal body sizes for women. Men, however, don't judge themselves so harshly.



Lighter ← → Heavier

What women believe is ideal

What women believe men like best

What men actually like best

Average of women's current body image

Research on genetic factors has, however, challenged the assumption that social pressures are the sole cause of anorexia and bulimia (Novotney, 2009; Striegel-Moore & Bulik, 2007). The genetic argument makes sense from an evolutionary standpoint, says clinical psychologist Shan Guisinger (2003). She points to the hyperactivity often seen in individuals with anorexia—as opposed to the lethargy common in most starving persons. This suggests, she says, that hyperactivity may have been an advantage for our ancestors, under starvation conditions. Individuals who are hyperactive when starving may be motivated to survive by leaving famine-impoverished environments.

All in all, it is beginning to appear that anorexia—like hunger itself—is a condition caused by multiple factors that stem from biology, cognition, and social pressures.

## 9.5.5:  Obesity and Weight Control

At the other extreme of weight control, the problem of obesity has grown at an alarming rate in the U.S. since the early 1980s. As a result, more than 2 of every 3 Americans are overweight, and a third are now classified as obese (National Institute of Diabetes and Digestive and Kidney Diseases, 2012). The real problem, of course, is not obesity but the associated health risks for such problems as heart disease, stroke, and diabetes—although experts disagree

on just how much of a problem this is among those who are only slightly overweight (Couzin, 2005; Gibbs, 2005). Unfortunately, the fundamental causes of this obesity epidemic are not well understood (Doyle, 2006).

No one in the field of obesity research believes that the condition results from the lack of "willpower"—a simplistic explanation, as we will see in the next section (Friedman, 2003). Rather, most experts believe that obesity results from multiple factors, just as does anorexia. Prominent among them are poor diet, including super-size portions and an increasing prevalence of foods high in fat and sugar. In one suggestive experiment, rats given a diet of sausage, Ho Hos, pound cake, bacon, and cheesecake quickly lost the ability to control their eating and became obese (Johnson & Kenny, 2010).

Genetics also have a role, but so does activity level (Bell, 2010; DeAngelis, 2004a; Flier & Maratos-Flier, 2007). Evidence for the latter comes from the long-term Nurses' Health Study, which showed that every 2-hour increase in daily TV watching translated into a 23% increase in obesity (Hu and others, 2003).

From an evolutionary standpoint, humans are still Stone Age creatures, biologically adapted to deal with periods of feast and famine. We tend to eat more than we need when food is abundant as an unconscious hedge against future periods of starvation. Unfortunately, this Stone-Age strategy is not well suited to life in a modern world—where most people in developed countries will never face famine or have a need to expend energy hunting game or digging roots. Nor are we well suited for a daily diet of French fries, deep-dish pizzas, doughnuts, candy, and nachos, which appeal to our deeply ingrained tastes for salty, fatty, and sweet foods—which just happen to be rich in calories (King, 2013; Parker-Pope, 2009; Pinel and others, 2000).

Nor does the problem stem from lack of awareness. Americans, especially, are obsessed by weight and weight loss, as a glance at the magazine headlines on the newsstand will show. At any given time, approximately 3 out of 10 adult Americans say they are on some sort of weight-control diet (Gallup, 2010).

Despite all we know about hunger and weight control, no one has yet discovered a weight-loss scheme that really works for most people. Notwithstanding nationally advertised claims, no diet, drug, or other weight-loss gimmick has ever produced long-term weight loss for a majority of the people who have tried it. Yet for those struggling with excess weight, it is encouraging to know that some potentially effective weight-control drugs are being tested as you read this, although it may be several years before anything both safe and effective comes to market (Flier & Maratos-Flier, 2007). In the meantime, experts suggest that the best pathway to long-term weight control involves maintaining a well-balanced diet, a program of moderate exercise, and,

if you want some extra help, nutritional counseling and cognitive–behavioral therapy (Institute of Medicine, 2002; Rich, 2004).

# 9.6: The Problem of Willpower, Turnips, and Chocolate Cookies

**Objective:** **Explain why psychologists prefer terms such as *impulse control*, or *emotional control* to "will power"**

Psychologists usually don't talk much about "willpower," although the term creeps into everyday conversation, where it usually refers to resisting food, drink, or some other temptation. In particular, psychologists don't like the archaic assumption of the "will" as a special faculty of the mind—a throwback to 19th-century **phrenology**. In this way, "willpower" is like the term "instinct"—merely a label rather than an explanation. Psychologists also object to the term "willpower" when it is used as a moral judgment, to suggest that someone has a character deficiency—a "weak will."

## 9.6.1: Alternatives to Willpower

Psychologists now prefer terms such as self-control, *impulse control,* or *emotional control*. These terms carry less baggage—are less negative—and they can be related to controllable environmental influences. For example, it is more positive—and more helpful—to understand that the abundance of food makes controlling one's eating more difficult during the holiday season, than to think of oneself as weak in willpower.

Still, people do differ in the amount of control they show when led into temptation. And psychologists have contrived devilish tests to measure these individual differences. What have they found? To nobody's surprise, the

ability to control one's impulses correlates with all sorts of positive outcomes, including better mental health, more effective coping skills, better relationships, and higher academic achievement. But such findings still leave the big question unanswered: What *is* self-control—or "willpower," if you will?

## 9.6.2:  The Biology of Self-Control

A research team at Florida State University seems to have placed the ability to resist temptation on a more solid scientific footing (Gailliot and others, 2007). What they found is that self-control is itself controlled by biology, and that control comes with a price. Let's have a closer look at those studies.

The Florida group first placed undergraduate psychology students in one of several onerous situations in which they were asked to exercise self-control—such as resisting a tempting plate of warm, freshly baked chocolate cookies or watching a funny video clip without laughing. Then the researchers gave the students a second task, such as a scrambled-word problem or a hand–eye coordination test. A control group also performed the second task, but they were *not* first asked to stifle their laughter, nor were they exposed to plates of tempting cookies. (As a control, they sat in front of a bowl of turnips.)

Before we go any further, see if you can predict who did worse on the second task.

**Was it those in the experimental group, who had to resist their impulses? Or was it the control group, who did not?**

You were right if you guessed that those who had to face down temptation (resisting the cookies or soberly watching the funny video) were *less* successful on the second task. Apparently self-control is a resource that, like physical stamina, can become temporarily depleted, when you have to use it. But what is it?

Surprisingly, self-control seems to have a physical presence in the blood, as well as in behavior. The study found that, after being required to control their urges, participants had lower blood-sugar levels than those who had not needed to exercise self-control. Knowing that sugar (glucose) is an energy source for the body, the experimenters concluded that exerting willpower used up some of that energy, making people less efficient on the second task (Baumeister and others, 1998, 2007; Wargo, 2009).

But there is hope for those weak of will! In a second phase of the experiment, a sugared drink was given to those who earlier had to resist temptation. That drink not only brought the participants' glucose levels back to normal but brought their performances back to the level of those who had *not* been tempted. Apparently, what we call "will-power" derives from the body's glucose energy reserves.

So, should you have a cola and a candy bar to boost your "will" before the next psychology test? Probably not such a good idea, says Matthew Gailliot, leader of the Florida study—especially if you are trying to control your weight. Better, he says, to keep your energy level up with a diet that includes longer-lasting proteins or complex carbohydrates (Cynkar, 2007a).

But glucose depletion is not the whole story. Newer research suggests that people's *beliefs* about "willpower" can also modulate their performance on tasks requiring mental concentration. Those participants who believed willpower to be a limited resource that can be depleted performed more poorly on a second task than those who believed that willpower is *not* depleted by mental effort (Job and others, 2010).

And some additional advice from a cognitive perspective: If you want to ensure that you are mentally sharp, moderation is a better strategy than complete denial. Have a cookie . . . occasionally!

## 9.7:  Sexual Motivation: An Urge You Can Live Without

**Objective:** **Explain how is the sex drive different from hunger and thirst (other than the behavior involved). Explain also the major concepts about sex advanced by Kinsey, Masters and Johnson, Peplau, and the evolutionary psychologists**

No one enjoys being hungry or thirsty. But sexual arousal doesn't work the same way: Unlike hunger or thirst, mere *arousal* of the **sex drive** can be pleasurable. And even though sexually aroused individuals may seek to reduce the tension by mating or other sexual activity, the sex drive is not homeostatic—again *un*like hunger and thirst; that is, having sex does not return the body to an equilibrium condition.

But sexual motivation *is* like hunger in another respect. Both can serve diverse goals, including pleasure and social bonding. In other words, both sex and hunger are motives that can operate at multiple levels in the hierarchy.

In yet one other way, sexual motivation is like hunger and thirst: It has its roots in survival. Even so, sex is unique among biological drives because lack of sex poses no threat to the *individual's* survival. We can't live for long without food or water, but some people live their lives without sexual activity (although some would say that that's not really living). Rather, sexual motivation involves the survival of the *species*, not the individual.

All the biological drives—sex included—exert such powerful influences on behavior that they have led to

numerous social constraints and taboos, such as prohibitions on eating certain meats or drinking alcohol. In the realm of sexuality, we find extensive culture-specific rules and sanctions involving a wide variety of sexual practices. In fact, all societies regulate sexual activity, but the restrictions vary widely. For example, homosexuality has been historically suppressed in the United States and in Arab cultures, but it is widely accepted in many Asian and Pacific Island nations. Rules about marriage among relatives and exposure of genitals and breasts also vary from culture to culture.

Even the discussion of sex can become mired in taboo, misinformation, and embarrassment. Scientists who study human sexuality have felt intense social and political pressures, which show no signs of abating in the present. The result is that the scientific knowledge about sexuality has been hard won.

## 9.7.1: The Scientific Study of Sexuality

In the mid-20th century, a titillated public clamored to read the first major scientific study of human sexuality, based on interviews of some 17,000 Americans. In two scholarly books—one on men and one on women—Alfred Kinsey and his colleagues (1948, 1953) revealed that certain behaviors (oral sex, for example), previously considered rare and even abnormal, were actually quite widespread. While Kinsey's data is now more than 60 years old, his interviews continue to be considered an important source of information about human sexuality, especially since no one else has conducted such in-depth interviews of such a large and varied sample.

In the 1990s, another large survey of American sexuality updated Kinsey's data—again in two volumes: *The Social Organization of Sexuality: Sexual Practices in the United States* (Laumann and others, 1994) and a smaller, more readable companion volume called *Sex in America* (see Table 9.2) (Michael and others, 1994).

This project, known as the National Health and Social Life Survey (NHSLS), involved interviews of 3,432 adults, ages 18 to 59. While these surveys had some built-in sources of bias (for example, only English-speaking persons were interviewed), the NHSLS managed to get a remarkable response rate: Of those recruited for the survey, 79% agreed to participate. When melded with other surveys taken since Kinsey's time, this work showed, among other things, a marked increase in the percentage of youth who are sexually active, along with a declining age at first intercourse (Wells & Twenge, 2005).

**Table 9.2** Sexual Preferences and Behaviors of Adult Americans

| Frequency of Intercourse | Not at All | A Few Times per Year | A Few Times per Month | Two or More Times per Week |
|---|---|---|---|---|
| Percentage of men | 14 | 16 | 37 | 34 |
| Percentage of women | 10 | 18 | 36 | 37 |

| Number of Sexual Partners Since Age 18 | 0 | 1 | 2–4 | 5–10 | 10–20 | 21+ |
|---|---|---|---|---|---|---|
| Percentage of men | 3 | 20 | 21 | 23 | 16 | 17 |
| Percentage of women | 3 | 31 | 31 | 20 | 6 | 3 |

| Infidelity While Married | |
|---|---|
| Men | 15.1% |
| Women | 2.7% |

| Sexual Orientation | Males | Females |
|---|---|---|
| Heterosexual | 97.8* | 97.7 |
| Homosexual | 1.8* | 1.5* |
| Bisexual | 0.4* | 0.9* |

Table based on survey of 3,432 scientifically selected adult respondents. There has not been a major survey of American sexual preferences and behaviors since 1994.

*Data on sexual orientation comes from adults who self-identified on a 2013 survey as primarily heterosexual, homosexual, or bisexual. The data are similar to the 1994 Gagnon, Laumann, & Kolata report. Source: Ward, B. W., Dahlhamer, J. M., Galinsky, A. M., & Joestl, S. S. (2014, July 14). Sexual orientation and health among U.S. adults: National Health Interview Survey, 2013. *National Health Statistics Reports*, No. 77. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. Retrieved from http://www.cdc.gov/nchs/data/nhsr/nhsr077.pdf

A smaller but more recent survey, however, shows that the percentage of teens who say they are virgins has increased slightly in the past decade (Doyle, 2007). Estimates of homosexual and bisexual preferences have also risen moderately. And in a study comparing identical twins with fraternal twins, researchers found that the age at which individuals first have sex is strongly influenced by genetics (Weiss, 2007). Because the same study also showed a genetic influence on the tendency to get in trouble with the law, the scientists speculate that the underlying factor may be a risk-taking tendency.

## 9.7.2: Gender Similarities and the Physiology of Sex

Although Kinsey first shocked the nation's sexual sensibilities, it was William Masters and Virginia Johnson (1966, 1970, 1979) who really broke with tradition and taboo by bringing sex into the laboratory. Never before had scientists studied sex by directly observing and recording the responses of hundreds of people engaging in sexual behavior of various sorts, including masturbation and intercourse. During these observational studies, Masters and Johnson discovered not what people *said* about sex but how people actually *reacted physically* during sex. In the wake of their daring departure from tradition and publication of their landmark discoveries, the study of human sexual behavior has finally become accepted as a legitimate field of scientific inquiry.

**WHAT DID THEY DISCOVER?**  Their observations revealed four distinct phases of human sexual response, which Masters and Johnson collectively called the **sexual response cycle** (see Figure 9.6):

But the sexual response cycle was not the only discovery. Their data, from observations of nearly 700 sexual acts, produced the following newsworthy conclusions:

- Men and women have remarkably similar patterns of biological response, regardless of the source of sexual arousal—whether it be heterosexual or homosexual acts, intercourse or masturbation.
- Although the phases of the sexual response cycle are similar in the two sexes, women tend to respond more slowly but often remain aroused longer.
- Many women can have multiple orgasms in a short time period, while men rarely can do so.
- Size of the genitals is generally unrelated to sexual performance (unless one is worried about the size of one's genitals).

Most important, perhaps, Masters and Johnson used their discoveries about sexual behavior to develop effective behavioral therapies for a variety of sexual disorders, including male erectile disorder (inability to achieve or maintain an erection), premature ejaculation, and female orgasmic disorder. These are detailed in their book *Human Sexual Inadequacy* (1970).

### WRITING PROMPT

**Gender Differences in Sexual Response**

From an evolutionary perspective, why do you suppose that women tend to respond more slowly than men to sexual stimuli and also remain aroused longer?

▶ | The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

**Figure 9.6**  The Sexual Response Cycle

### 9.7.3: Men and Women Also Differ in Their Sexuality

While Masters and Johnson called our attention to the similarities between men and women in the sexual response cycle, other researchers have taken the opposite view, focusing on the differences. For example, Ann Peplau (2003) has found four especially important differences between men and women:

- First, she notes, *men show more interest in sex than do women*—on the average, of course. Men not only think about sex more often, but they are also more likely to attend to visual sexual stimuli. They also generally prefer to have sex more frequently than do women.

- Second, *women are more likely than men to view sex in the context of a committed relationship*; that is, says Peplau, women are more likely to "romanticize" sexual desire as a longing for emotional intimacy, while men tend to see sex more as physical pleasure. As a result, women generally (both heterosexual and lesbian women) have a less permissive attitude toward casual sex than do men (including both gay and straight men).

- Third, *sex is more likely to be linked with aggression for males than for females.* As you probably know, rape is almost exclusively an act committed by males. But even in milder forms, aggression is more a male than a female characteristic. For example, men are more likely to be domineering or abusive in a sexual relationship. (We should add that, even though these gender differences seem to have a biological basis, nothing in this fact excuses hurtful or forced sexual behavior.)

- Fourth, Peplau argues that *women's sexuality has greater "plasticity."* By that she means that women's behaviors and beliefs are more readily shaped by cultural and social factors, as well as by the immediate situation. For example, women's sexual activity over time is far more variable in its frequency than men's. This is especially true when sexual circumstances change, as in a divorce. Cultural factors, such as religion and cultural norms, also influence women's sexuality more than men's. Especially interesting is the fact that higher education is, for both men and women, correlated with more liberal sexual attitudes—but the effect is much stronger for women.

Other work has focused on differences between men's and women's brains (Portner, 2008). For example, many regions associated with emotional control in a woman's brain—unlike a man's—seem to fall silent during orgasm. That response, suggest researcher Gert Holstege and her colleagues (2003), involves the dampening of anxiety responses that could otherwise inhibit orgasm. Looking at differences in sexual orientation, Meredith Chivers and her colleagues (2007) have discovered that heterosexual women are aroused by a broader range of erotic stimuli than are heterosexual men. Moreover, gay men and lesbian women are more particular in their erotic tastes than are their heterosexual counterparts.

### 9.7.4: An Evolutionary Perspective on Sexuality

Biologically speaking, the goal of both sexes is to leave as many offspring as possible. Yet the potential physical costs of mating and parenting differ for males and females (Bjorklund & Shackelford, 1999). As a result, the sexes have evolved different—and sometimes conflicting—mating strategies, say the evolutionary psychologists (Buss, 2008; Gallup & Frederick, 2010; Meston & Buss, 2009). (We are speaking of heterosexuals here, because the evolutionary aspects of homosexuality and bisexuality are unclear at this point.)

Females can produce only a few children over a lifetime, because they have a limited number of ova and a limited window of fertility each month, and because they must make a huge biological investment in pregnancy and nursing. Therefore, the best sexual strategy for females is to be highly selective about their mates. For males, however, the costs and benefits are much different because they produce millions of sperm, and they, of course, cannot become pregnant. Nor do they usually typically spend as much time with children as women do. For males, then, the biggest biological payoff results from copulating as often as possible with as many fertile females as possible. As a result, men tend to seek young and physically well-developed partners, while females may seek somewhat older mates who can offer resources, status, and protection for offspring. Not incidentally, these very different agendas for males and females can lead to lying, jealousy, subterfuge, and conflict.

Although the evolutionary perspective may seem cold-hearted in its view of sexual motivation, it *does* account for many gender differences in mating behaviors, such as the larger number of sexual partners typically reported by men than women (see Table 9.2). Even so, biology does not prohibit the learning of alternative sex roles and scripts, nor does it explain the social and cultural pressures that cast men and women in different roles (Eagly & Wood, 1999). Moreover, evolutionary psychology does not explain why many people remain with their mates over extended periods of time (Hazan & Diamond, 2000) or why gay and lesbian relationships persist across cultures. A complete understanding of human sexual motivation, therefore, must include both its evolutionary roots and the many variations that occur through learning.

# 9.8: Sex, Hunger, and the Hierarchy of Needs

**Objective:** **Explain the relationship between sex and hunger**

As we have noted, Maslow said almost nothing about sex. The new evolution-based needs hierarchy, however, corrects this omission. Kenrick's group still gives priority to hunger, thirst, and other survival needs at the base of the hierarchy. Sex follows with a lower priority, along with the related motives of attachment, affiliation, belongingness, and parenting. But this doesn't mean that a slice of pizza always wins over the opportunity for sex. As we have seen, the hierarchy is fluid, not rigid. In addition, hunger and sex are both biological drives *and* psychological motives. Because biological drives generally have priority over psychological motives, the attraction of sex can sometimes take precedence over eating—in which case proximal sex overpowers proximal pizza.

## Psychology Matters

## The What and Why of Sexual Orientation

Ever since Kinsey's first reports were published, we have known that human **sexual orientation** is a complex issue. In brief, the main indicator of your sexual orientation is the sex of those you customarily find sexually attractive, along with your sense of sexual identity—the sex with which you identify yourself—based on that attraction (American Psychological Association, 2011; Herek and others, 2010).

**Heterosexuality** and **homosexuality** represent two major forms of sexual orientation: A heterosexual orientation is to the opposite sex; a homosexual orientation is to the same sex. (A word of caution: The terminology is unsettled—so *gay and lesbian* is preferred to *homosexual* by many, because of negative historical associations and because homosexual is sometimes assumed to refer just to gay males, excluding lesbians.) Another common variation is **bisexuality**, which refers to sexual interest in both males and females (Diamond, 2008). But to complicate matters, cross-cultural studies reveal considerable variability in sexual orientation. In parts of New Guinea, for example, the culture dictates that homosexual behavior is universal among young males, who then switch to a heterosexual orientation when they marry (Money, 1987). Among American adults, various estimates put the percentage of gay and lesbian sexual orientation at 1% to 9%, depending on whether these are defined as (a) one's exclusive orientation, (b) one's primary orientation, (c) feelings of attraction to persons of the same sex, or (d) having

*ever* engaged in same-sex erotic behavior (Diamond, 2007; Savin-Williams, 2006). Incidentally, same-sex erotic behavior is quite common among animals—particularly bonobos (pigmy chimpanzees), who are genetically close relatives of humans (Driscoll, 2008).

The term **transgender** refers to a diverse group of people who identify in various ways with gender expressions that are not typical of their biological sex. So, for example, some transgender persons with the physical characteristics of a male may identify as a female. Another common transgender manifestation involves "cross-dressing," in which the individual identifies with the clothing styles customarily associated with the opposite gender in their culture (American Psychological Association, 2015). However, according to the American Psychological Association, not everyone whose appearance or behavior does not conform to gender stereotypes identifies as transgender. Moreover, neither is cross-dressing, nor any other transgender category, reliably associated with one's sexual orientation; that is, knowing that a person is transgender tells us nothing about whether the individual is heterosexual, homosexual, or bisexual (Devor, 1993). And, you should note that none of these sexual variations is considered pathological by modern psychology or psychiatry.

## The Origins of Sexual Orientation

So, what does the available evidence tell us about the factors that determine sexual orientation?

We're not sure—but we know several things that are *not* involved. Speaking biologically, we know that sexual orientation in adults is *not* related to testosterone levels—although the issue of testosterone or estrogen influences on the fetus is still an open question (McAnulty & Burnette, 2004). From a social perspective, we also know that parenting styles or family configurations do *not* cause children to identify as straight or gay (Golombok & Tasker, 1996). Similarly, researchers have come up empty handed in their attempts to link human sexual orientation to early sexual experiences, such as molestation or other abuse.

Much of the work on sexual orientation has focused on biology, and most experts have concluded that sexual orientation is largely innate. To illustrate this research, consider a famous study of male identical twins. Richard Pillard and Michael Bailey (1991) discovered that when one twin is gay, the chance of the other also being gay is about 50%. The same study also found that the rate drops to 22% for fraternal twins and 11% for adoptive brothers of gays—which is still higher than in the general population. A later study of female twin pairs produced essentially the same results (Bower, 1992). The fact that the concordance in identical twins is not 100% hints that some **epigenetic** factor may be at work.

One of the more puzzling findings links sexual orientation in males (but not females) to birth order, specifically how many older brothers one has (Abrams, 2007; Blanchard, 2008; Bogaert, 2005). The more older brothers, the more likely a boy is to be gay. This effect occurs whether or not boys are raised with their biological brothers, according to a study of adopted versus biological brothers—a finding that apparently rules out

environmental influences after birth (Bogaert, 2006). While no one knows what the causative factor is, some scientists believe that some epigenetic factor or some aspect of the pre-natal environment tips the balance one way or the other (Bower, 2006a).

The origin of a same-sex orientation poses an interesting and unsolved problem for evolutionary psychologists—particu-larly if they assume that the genetic imperative of both sexes is to leave as many offspring as possible. So, where is the bio-logical advantage in being gay or lesbian? Several theories suggest that non-reproducing individuals (including grandpar-ents!) may provide services for kin or the community, including acting as priests and shamans or providing child care. What-ever the evolutionary logic of sexual orientation may be, it remains a scientific mystery (Barash, 2012). As you might guess, research in this area remains controversial because of the strong feelings, political issues, and prejudices involved (Herek, 2000). Such research has also attracted scientific criti-cism because much of it is correlational—rather than experi-mental—so the data cannot establish cause and effect with certainty. And in the gay and lesbian community, some observ-ers object to this whole line of work, saying that gay men and lesbians should not feel pressured to justify their behavior by seeking a "cause" for it (Byne, 1995).

## Not a Disorder

Until the 1970s, the diagnostic manual of the American Psychi-atric Association listed homosexuality as a mental disorder—a classification that has since been removed and repudiated by both psychologists and psychiatrists (Greenberg, 1997). More recently, the American Psychological Association passed a resolution advising against therapies aimed at changing sexual orientation, on the grounds that they are ineffective, unneces-sary, and potentially harmful (Munsey, 2009).

*And what does the evidence say about the relationship between sexual orientation and mental health?* The clear message from numerous studies says that mental disorders and relationship problems occur in about the same propor-tion in heterosexuals and homosexuals (DeAngelis, 2002c; Kurdek, 2005). As we might expect, the only exception involves stress-related problems—such as anxiety and depression—associated with discrimination against homo-sexuals. The research also shows no differences in adjust-ment or development of children raised by heterosexual or homosexual parents (American Psychological Association, 2010b; Patterson, 2006).

*So, where does this leave us in our understanding of sex-ual orientation?* Attitudes toward minority forms of sexual orien-tation differ sharply among cultures around the world, with Americans among the most divided on issues such as gay and lesbian marriages, currently a controversial issue in the U.S., despite the recent Supreme Court decision on marriage equal-ity. Again, most experts—but not all—would say that the research supports a strong biological influence on sexual orien-tation. Just how biology might influence our behavior in the bedroom, however, remains a major puzzle and a topic for continuing research.

# Key Question: How Do Our Emotions Motivate Us?

> ### Core Concept 9.4
> **Emotions are a special class of motives that help us attend to and respond to important (usually external) situations and communicate our intentions to others.**

Most people believe that emotion is the opposite of reason—but that's a misunderstanding.

Consider the case of Elliot: Once an ideal employee, Elliot's performance gradually began to slip. If anything, his supervisors said, Elliot had become almost too focused on the details of his work, yet he had trouble setting priorities. He often latched onto a small task, such as sorting a client's paperwork, and spent the whole afternoon on various clas-sification schemes—never quite getting to the real job he had been assigned. Finally, he lost his job (Damasio, 1994).

Elliot's personal life also fell apart. A divorce was fol-lowed by a short marriage and another divorce. Several attempts at starting his own business involved glaringly flawed decisions that eventually ate up all his savings.

Yet, surprisingly, Elliot seemed normal in most other respects. He had a pleasant personality and an engaging sense of humor. He was obviously smart—well aware of important events, names, and dates. He understood the polit-ical and economic affairs of the day. In fact, examinations revealed nothing wrong with his movements, memory, per-ceptual abilities, language skills, intellect, or ability to learn.

Complaints of headaches eventually led the family doctor to suspect that the changes in Elliot pointed to something wrong in his brain. Tests proved the suspicion correct. A mass the size of a small orange was pressing on the frontal lobes just above Elliot's eyes.

The tumor was removed, but not before it had damaged the frontal lobes. As a psychologist who examined him said, "We might summarize Elliot's predicament as *to know but not to feel*" (Damasio, 1994, p. 45). His reasoning abilities were intact, but the damage to the circuitry of Elliot's frontal lobes disrupted his ability to use his emotions to establish priori-ties among the objects, events, and people in his life. In short, Elliot had been emotionally crippled by the tumor. With a disruption in his ability to connect concepts and emotions, he could not value one course of action over another.

*So, what does Elliot's case tell us about the role of emotions in our thinking?* What happened to Elliot makes it clear that emotion is an essential component of thinking and, espe-cially, in remembering important events, weighing alterna-tives, and making decisions (Chen, 2012; Forgas, 2008; Gray, 2004). In the remainder of this chapter, we will explore some discoveries about how the brain processes emotions and what these discoveries mean about the inti-mate connection between emotion and reason. As our core

concept indicates, emotions help us attend to, respond to, and communicate with others.

> Emotions are a special class of motives that help us attend to and respond to important (usually external) situations and communicate our intentions to others.

By the end of this section, you will be able to:

**9.9** Explain the functions of emotions, and list the ones that seem to be universal.

# 9.9: How Is Emotion Related to Motivation?

**Objective:** Explain the functions of emotions, and list the ones that seem to be universal

Note that both words share a common root, *"mot-"* from the Latin *motus,* meaning "move." As a first approximation, you might think of emotion as a special sort of motivation directed outward—toward people, objects, and events that excite us in some way. (Compare this with motives, such as hunger and thirst, which may arise from an internal need.) Emotions increase our arousal and attach the values we call "feelings" to things we judge as important. Emotion also motivates an approach or avoidance response. To see how this works, let's look more closely at these several components of emotion.

## 9.9.1: What Emotions Are Made Of

In brief, every **emotion** has four main components: physiological arousal, cognitive interpretation, subjective feelings, and behavioral expression. We can illustrate with an example closer to home.

Suppose that you win a cool $50 million in the lottery. Chances are that the news will make you jump and shout, your heart race, and a wave of joy wash over your brain. Congratulations! You have just had an emotion! The **physiological arousal** component involves an alarm broadcast simultaneously throughout the autonomic nervous system and the endocrine system. The result is an extensive visceral response that includes your racing heart.

A second component of emotion, a *cognitive interpretation* of events and feelings, involves a recognition and evaluation of the situation. Is it good or bad? Attractive or fearsome? Undoubtedly, you would interpret the news about your winning lottery ticket as good, but the same processes—both conscious and unconscious—can happen with unpleasant experiences, too. (We will see later that the brain has two different emotional pathways that are involved in evaluating events: One is mainly conscious and the other operates unconsciously.)

The *subjective feeling* component of your emotion may come from several sources. One involves the brain sensing the body's current state of arousal. The other comes from memories of the body's state in similar situations in the past. For each of these memorable feelings, the brain stores a sort of emotional "body image" that Antonio Damasio (1994, 2003) calls a *somatic marker.* In response to, say, a hungry bear chasing you, your brain retrieves a body-image memory of how you felt during past encounters with danger, including a racing heart, a cold sweat, and the muscular feeling of running away.

The recently discovered **mirror neuron** system is yet another source of emotional feelings. When you see someone else's emotional state, as in a sad movie, these brain circuits are believed to activate, "mirroring" the somatic markers of the emotion you are observing (Miller, 2006c; Niedenthal, 2007). In our hungry bear example, your mirror neurons may reflect the emotions of a companion who sees the bear before you do. Numerous studies support this conjecture, but one of the more interesting ones involved the positive emotions of romantically involved couples. When researchers looked at the simultaneous brain scans of such couples, they found when one had an unpleasant experience, the other showed essentially the same changes in the emotion-related parts of the brain (Singer and others, 2004).

The fourth component of emotion produces an *expression of emotion in behavior.* So, when you learned of your lottery winnings, you probably smiled, gave a whoop of joy, and perhaps danced around the room as you babbled the news to your companions. As for the hungry bear, it would most likely activate the "fight-or-flight" response, as well as in emotion-laden facial expressions and vocalizations.

And what functions do these emotional responses serve? Surely emotions must do more than just adding variety or "color" to our mental lives. Let's see.

## 9.9.2: What Emotions Do for Us

Whether they occur in humans, hyenas, cats, or kangaroos, emotions serve as arousal states that signal important events, such as a threat or the presence of a receptive mate. They also become etched in memory to help the organism recognize such situations quickly when they recur (Dolan, 2002; LeDoux, 1996; Lee, 2009). Meanwhile, the nonverbal expression of our emotions serves to communicate our feelings to others (Shariff & Tracy, 2011). And, as we have noted, emotions help us make decisions (De Martino and others, 2006; Miller, 2006a; Naqvi and others, 2006).

Consider Marcus Mariota, deciding whether to run or pass or identifying to which receiver he will throw the ball. As he spots each receiver downfield, Mariota's emotions attach a value to each, depending on their positions,

coverage, and ball-catching history. After weighing those values, he makes his decision and makes his play.

In general, emotions are either *positive* or *negative,* which leads to a tendency for *approach* or *avoidance* (Davidson and others, 2000). The "approach" emotions, such as delight and joy, are generally positive, and they make a person, object, or situation attractive. Brain scans suggest that these approach emotions involve the dopamine reward system. In contrast, most of the negative emotions, such as fear and disgust, are associated with rejection or avoidance—as when we feel fear when going to the dentist. These avoidance emotions usually involve the **amygdala**.

Natural selection has shaped our emotional responses, which explains why they well up in situations that might affect our survival or reproductive success (Gross, 1998; Izard, 2007). Fear undoubtedly helped individuals in your family tree to avoid situations that could have made them a meal instead of an ancestor. Similarly, the emotion we call "love" may draw us into a family group, which helps to continue our genetic line. Likewise, sexual jealousy can be seen as an emotion that evolved to deal with the biologically important problem of mate infidelity, which threatens an individual's chances of producing and raising offspring (Buss & Schmitt, 1993).



Sexual jealousy probably has an evolutionary basis because mate infidelity threatens the individual's chances of producing offspring.

Humor, too, may have evolved to serve a social purpose, as we can surmise from the "in-jokes" and rampant laughter among people in tightly knit social groups (Ayan, 2009; Provine, 2004; Winerman, 2006d).

Remember that emotions are motives, so we need to fit them into the new evolution-based hierarchy. Obviously, many emotions relate to survival, such as the fear in our hungry-bear example. Other emotions relate to sexual

arousal and reproduction, as in the attraction you feel to potential mate. The survival-related emotions, then, would operate near the base of the motivational pyramid, where they generally have a high priority. That leaves the sex- and affiliation-related emotions—attraction and love, for example—on the upper levels of the hierarchy, where they generally have lower priority.

### 9.9.3: Counting the Emotions

*How many emotions are there?* A long look in the dictionary turns up more than 500 emotional terms (Averill, 1980). Most experts, however, see a more limited number of *basic emotions.* Carroll Izard (2007) argues for six: interest, joy/ happiness, sadness, anger, disgust, and fear. Paul Ekman's list contains seven: anger, disgust, fear, happiness, sadness, contempt, and surprise—based on the universally recognized facial expressions he has studied. And Robert Plutchik (1980, 1984) has made a case for eight basic emotions that emerged from a mathematical analysis of people's ratings of a large number of emotional terms (see Figure 9.7).

**Figure 9.7** The Emotion Wheel

Robert Plutchik arranges eight primary emotions on the inner ring of his "emotion wheel." Pairs of adjacent emotions can combine to form more complex emotions, as shown on the outer ring. For example, love is portrayed as a combination of joy and acceptance.



More recent work suggests that Plutchik's list could be expanded to include pride (Azar, 2006; Tracy & Robins, 2004). Even though different theorists approach the problem in different ways, their differences are relatively minor. The essential idea that we probably have a limited number

of basic emotions with a larger number of *secondary emotions* that involve blends of the more basic ones.

## 9.9.4: Cultural Universals in Emotional Expression

You can usually tell when a friend is happy or angry by the look on her face or by her actions—which is useful in deciding whether to spend Friday evening with her at the movies. More generally, we have seen that communication through emotional expression is helpful in our social interactions (Shariff & Tracy, 2011). But does raising the eyebrows and rounding the mouth convey the same message in Minneapolis as it does in Madagascar? In Bangkok and Boston? Much research on emotional expression has centered on such questions.

According to Paul Ekman (2003), the leading authority on facial expression of emotions, people speak and understand the same basic "facial language" the world around. Ekman's group has demonstrated that humans share a built-in set of emotional expressions that testify to the common biological heritage of the human species. Smiles, for example, usually signal happiness and frowns indicate sadness on the faces of people in such far-flung places as Argentina, Japan, Spain, Hungary, Poland, Sumatra, the United States, Vietnam, the jungles of New Guinea, and the native villages north of the Arctic Circle (Biehl and others, 1997).

It may not surprise you to learn that a person's gender can make a difference in what we read into his or her facial expressions. One study found a bias toward seeing anger in men's faces and happy expressions in women's faces (Becker and others, 2007). This finding makes sense from an evolutionary perspective, because angry men have always been a source of danger, while a happy woman's face may have signaled safety (Azar, 2007).

You can check your own skill at interpreting facial expressions by going through the quiz in the *Do It Yourself!* box.

**Figure 9.8** Identifying Facial Expressions of Emotion

Apparently, people everywhere in the world interpret these expressions in the same way. This tells us that certain facial expressions of emotion are probably rooted in our human genetic heritage.



## Do It Yourself!
### Identifying Facial Expressions of Emotion

Take the facial emotions identification test to see how well you can identify differentiate each of the seven emotions that Ekman claims are culturally universal. Do not read the answers until you have matched each of the following pictures with one of these emotions: disgust, happiness, anger, sadness, surprise, fear, and contempt. Apparently, people everywhere in the world interpret these expressions in the same way. This tells us that certain facial expressions of emotion are probably rooted in our human genetic heritage.

As we have seen, Ekman and his colleagues (1987) claim that people everywhere can recognize at least seven basic emotions. Nevertheless, some differences exist across cultures in both the context and intensity of emotional displays, because of so-called **display rules**. In Asian cultures, for example, children are taught to suppress their emotional responses—especially negative ones—while Americans usually encourage their children to express their feelings more openly (Smith and others, 2006). Not surprisingly, people are generally better at judging emotions of people from their own culture than in members of another cultural group (Elfenbein & Ambady, 2003).

Regardless of culture, babies all express emotions, even at birth, when a lusty cry is a sign of good health. And from their first days of life, babies have the ability to display a small repertoire of facial expressions that communicate their feelings (Ganchrow and others, 1983). The ability to read facial expressions soon follows. Very young

children pay close attention to faces, and by age 5 they nearly equal adults in their skill at reading people's emotions (Nelson, 1987). Some evidence, however, suggests that at least one of Ekman's "basic" emotional expressions doesn't come so easily. According to James Russell, children do not understand the facial expressions indicating *disgust* until about age 5, even though they use words to express disgust (such as "gross" and "yucky") much earlier (Bower, 2010b; Russell & Widen, 2002).

All this work on facial expressions points to a biological underpinning for our abilities both to express and to interpret a basic set of human emotions. Studies also show that babies have an inborn tendency to quickly associate fear with certain objects, such as snakes and spiders—creatures that posed a danger to our ancestors (Erlich and others, 2013). Moreover, as Charles Darwin pointed out more than a century ago, some emotional expressions cut across species boundaries. Darwin commented especially on the similarity of our own facial expressions of fear and rage to those of chimpanzees and wolves (Darwin, 1862/1998; Ekman, 1984).

**But are *all* emotional expressions universal?** Cross-cultural psychologists tell us that certain emotional responses carry different meanings in different cultures (Ekman, 1992, 1994; Ellsworth, 1994). These, therefore, must be learned rather than innate. For example, what emotion do you suppose might be conveyed by sticking out the tongue? To Americans, this might indicate disgust or fatigue, while in China it can signify surprise. Similarly, a grin on an American face may indicate joy, but on a Japanese face it may just as easily mean embarrassment. To give one more example, a somber expression and downcast eyes might indicate unhappiness to someone in a Euro-American culture, whereas it could be a sign of respect to many Asians. Clearly, both biology and culture influence emotional expression.

## Psychology Matters

## Gender Differences in Emotion Depend on Both Biology *and* Culture

You may have suspected that some emotional differences between males and females have a biological basis. This would explain, for example, why certain emotional disturbances, such as panic disorder and depression, occur more commonly in women. Men, however, show more anger and display more physiological signs of emotional arousal during interpersonal conflicts than do women (Fischer and others, 2004). Anger, of course, can lead to violence—and men commit most of the world's violent acts.

Other gender differences, however, may depend as much on culture as on biology. For instance, in the United States, males and females usually learn quite different lessons about emotional control. Display rules dictate that men and boys show their anger (Fischer, 1993). Indeed, they may be rewarded for displays of anger and aggression. But they may be punished for "weak" emotional displays such as crying, depression, and sadness (Gottman, 1994). The pattern of reinforcement and punishment is reversed for females. Women and girls may receive encouragement for emotions that show vulnerability. But they may be punished for displaying emotions that suggest dominance (Fischer and others, 2004).

Despite these differences, neither sex is more emotionally expressive overall. Rather, cultures differ in emotional expression much more than do the sexes (Brannon, 2008; Wallbott and others, 1986). In Israel and Italy, for instance, men more often than women hide their feelings of sadness. The opposite holds true in Britain, Spain, Switzerland, and Germany, where women are more likely than men to hide sadness. In many collectivist cultures, as we have noted, both genders learn display rules to restrain all their emotional expressions. Overall, however, the differences among individuals overshadow the differences of either gender or culture.

## WRITING PROMPT

**How Did You Learn the Rules?**

Give an example from your own experience that either supports or contradicts the way boys and girls in the U.S. usually learn emotional display rules.

▶  `The response entered here will appear in the performance dashboard and can be viewed by your instructor.`

Submit

# Key Question: What Processes Control Our Emotions?

### Core Concept 9.5

**The discovery of two emotion-processing systems in the brain—one conscious and the other unconscious—has shed new light on some old controversies about emotion and cognition.**

Suppose that you are touring a haunted house at Halloween when a filmy figure startles you with ghostly "Boo!" Your emotional response is immediate. It may involve an outward reaction such as jumping, gasping, or screaming. At the same time, you respond internally with changes in

your body chemistry, the function of your internal organs, and arousal in certain parts of your brain and autonomic nervous system. Moreover, gut-level emotional responses, such as an accelerated heartbeat, can persist long after you realize that you were really in no danger—after you realize that you were frightened merely by someone dressed in a sheet.

This suggests that emotion operates on both the conscious and unconscious levels—which leads us to one of the great recent discoveries in psychology: the existence of two emotion pathways in the brain. These dual pathways are the focus of the core concept for this section:

> The discovery of two emotion-processing systems in the brain—one conscious and the other unconscious—has shed new light on some old controversies about emotion and cognition.

In the following pages, we will see how the young neuroscience of emotion has begun to identify the machinery that produces our emotions. The details have not yet become fully clear, but we do have a broad-brush picture of the emotion pathways in the brain and their connections throughout the body. So in this last section, we will first see how the two emotion pathways work. Then we will see how they have helped resolve some ancient disputes in the field. Finally, at the end of this section, we will turn to a practical application to learn how emotional arousal can affect our performance on an examination or in an athletic contest.

By the end of this section, you will be able to:

**9.10** **Describe the two emotional systems in the brain, along with their functions**

**9.11** **Explain the inverted U function and how it relates to sensation seekers**

**9.12** **Evaluate each of the major theories of emotion**

**9.13** **Describe the components of emotional intelligence, and explain whether or not it can be learned**

# 9.10: The Neuroscience of Emotion

**Objective:** **Describe the two emotional systems in the brain, along with their functions**

People who have an intense fear of snakes or spiders usually know that their responses are irrational, yet they can't seem to conquer them. But how can a person hold two such conflicting mindsets? The answer lies in the brain's two distinct emotion-processing systems identified by neuroscientist Joseph LeDoux (1996, 2000).

## 9.10.1: Emotions in the Unconscious

One emotion-processing system—the **fast response system**—operates mainly at an unconscious level, where it quickly screens incoming stimuli and helps us respond quickly to potentially dangerous events, even before they reach consciousness. This system, linked to *implicit memory*, acts as an early-warning defense that produces, for example, a hiker's near-instantaneous fright response to the sight of a snake (Helmuth, 2003b). It relies mostly on deep-brain circuitry—especially in the *limbic system*—that operates automatically, without requiring deliberate conscious control (see Figure 9.9, p. 348).

The unconscious emotion circuits have a built-in sensitivity to certain stimuli that posed threats throughout human history. Moreover, this quick-response system can easily learn new fears through classical conditioning. This explains why fears of spiders and snakes are more common than fears of, say, electricity or automobiles, which now cause more deaths than do spiders and snakes but have only recently posed dangers to us.

You can see how this configuration of the fast response system could be adaptive, because it errs on the side of caution. Unfortunately, the fast response system is also a slow-to-forget system, making it hard to extinguish the anxieties and fears that sometimes blossom into more serious problems known as **phobias**. This slowness to forget had survival advantages for our ancestors, because it made them more likely to remember dangerous situations, such as the predator lurking at the water hole.

## 9.10.2: Conscious Emotional Processing

The other emotional system—the one that involves conscious processing—is comparatively slow to respond. Its connections lie mainly in the cerebral cortex and especially involve **explicit memory** (LeDoux, 1996; Mather, 2007). This **slow response system** makes our hiker (in Figure 9.9) become cautious in places he has learned to associate with dangerous animals. Because the conscious system uses different brain circuits from those supporting unconscious emotional processing, your conscious view of events can differ significantly from the emotions roused by your unconscious. Thus, if you have a phobia, you can truly be of "two minds"—feeling fear, despite "knowing" that there is no sensible basis for the feeling. Both systems, however, are slow to forget fearful memories.

## 9.10.3: Lateral Differences in the Frontal Lobes

One cortical quirk deserves special mention: The two frontal lobes have complementary roles in controlling our

**Figure 9.9** Two Emotion-Processing Pathways

The fast (unconscious) system routes visual information from the thalamus directly to the amygdala, quickly activating fear and avoidance responses. The slow (conscious) pathway takes a longer route through the visual cortex, making a more complete appraisal of the stimulus before going to the amygdala.



emotions. Just as distinct patches of cortex produce different sensations, positive and negative emotions are associated with opposite hemispheres, an effect called **lateralization of emotion**. The evidence comes from EEG recordings of normal people's emotional reactions along with EEGs of people with damage to the right or left hemisphere (Davidson and others, 2000). In general, the right hemisphere specializes in negative emotions, such as anger and depression, while the left processes more positive, joyful emotions (Kosslyn and others, 2002).

## 9.10.4: Where the Cortex Meets the Limbic System

Neuroscientists now think they know where emotion and reason meet in the brain—where the conscious emotion-processing pathway meets the limbic system. It's a small patch of brain with a big name: the **ventromedial prefrontal cortex (VMPFC)**. Located on the floor of the brain's frontal lobes, just behind the eyes, the VMPFC has extensive connections with both the amygdala and the hippocampus (Barrett & Wager, 2006; Wagar & Thagard, 2006). There, like a recording technician combining inputs for a sound track, the VMPFC mixes external stimulation and conscious memory with the body's "gut" reaction. Was it positive or negative? Did it make your skin creep? Did you feel a lump in your throat? A knot in your stomach? Thanks to your VMPFC, most of your memories probably have such visceral associations attached.

Behind the VMPFC lies the *nucleus accumbens,* a patch of cortex concerned primarily with feelings of reward. The nucleus accumbens is thought to give us good feelings when we experience positive emotions. This brain region, incidentally, becomes highly active, releasing dopamine, when we listen to our favorite music or see a romantic partner (Gaidos, 2010; Levitin, 2006).

The fast-and-unconscious emotional pathway also connects to the brain's limbic system, as you can see in Figure 9.10. Situated in the layer above the brain stem, the limbic structures undoubtedly evolved as control systems for

**Figure 9.10** The VMPFC and the Nucleus Accumbens

Both the VMPFC and the nucleus accumbens lie on the midline of the brain, between the two hemispheres.



Medial prefrontal cortex

Prefrontal cortex

Ventromedial prefrontal cortex

Nucleus accumbens

The nucleus accumbens, lying behind the VMPFC, is associated with positive emotions, through connections with the brain's reward system.

The ventromedial prefrontal cortex (VMPFC) reunites the conscious and unconscious emotion pathways.

Amygdala

behaviors used in attack, defense, and retreat: the "fight-or-flight" response (Caldwell, 1995; LeDoux, 1994, 1996). Evidence for this comes from lesioning (cutting) or electrically stimulating parts of the limbic system, which can produce dramatic changes in emotional responding. Depending on which part of the limbic system is affected, tame animals may become killers, whereas prey and predators may become peaceful companions (Delgado, 1969).

Particularly well documented is the importance of the **amygdala** in the emotion of fear (LeDoux, 1996; Whalen, 1998; Winkielman and others, 2007). Like a guard dog, the amygdala stands alert for threats (Hamann and others, 2002; Helmuth, 2003a). As you can see in the figure, the amygdala receives messages from the quick-and-unconscious emotion-processing pathway as well as from the longer-and-slower conscious pathway.

## 9.10.5: The Neural Signatures of Our Emotions

In earlier times people looked for brain "centers" that controlled specific emotions. But they found none. There is no "anger module" or "happiness center" in the brain. Rather, according to neuroscientist Karim Kassam and his colleagues (2013), different emotions have distinctive "signature" patterns of activity distributed throughout the brain. Using "method" actors trained in recreating specific emotions, these researchers were able to identify distinct brain

activity patterns associated with nine emotions: disgust, anger, fear, happiness, lust, envy, pride, sadness, and shame.

## 9.10.6: The Autonomic Nervous System's Role in Emotion

Emotion is the business of the whole body, not just the brain. When you become emotionally aroused, the messages that you "take to heart" (and to other internal organs) flash from your brain through the autonomic nervous system to your skin, muscles, and internal organs (Levenson, 1992). It's the **parasympathetic division** that usually dominates in pleasant emotions. But when you are startled or experience some other unpleasant emotion, the **sympathetic division** goes into action (see Table 9.3, p. 350).

Suppose you are in an emergency. (A speeding car is coming directly at you!) Your brain alerts your body by means of messages carried along the nerves of the sympathetic system. Signals speeding along the sympathetic pathways direct the adrenal glands to release stress hormones. Other signals make your skin creep, your heart race, and blood pressure rise. Simultaneously, the sympathetic system directs certain blood vessels to constrict, diverting energy to the voluntary muscles and away from the stomach and intestines. (This causes the feeling of a "knot" in your stomach.)

When the emergency passes, the parasympathetic division takes over, carrying instructions that counteract

**Table 9.3** Responses Associated With Emotion

| Component of Emotion | Type of Response | Example |
|---|---|---|
| Physiological arousal | Neural, hormonal, visceral, and muscular changes | Increased heart rate, blushing, becoming pale, sweating, rapid breathing |
| Subjective feelings | The private experience of one's internal affective state | Feelings of rage, sadness, happiness |
| Cognitive interpretation | Attaching meaning to the emotional experience by drawing on memory and perceptual processes | Blaming someone, perceiving a threat |
| Social/behavioral reactions | Expressing emotion through gestures, facial expressions, or other actions | Smiling, crying, screaming for help |

the emergency orders of a few moments earlier. You may, however, remain aroused for some time after experiencing a strong emotional activation because hormones continue to circulate in the bloodstream. If the emotional situation is prolonged (as a soldier might experience on deployment in a war zone), the sustained emergency response can eventually cause both physical and mental problems.

## 9.10.7:  Emotional Chemistry

No, we are not talking just about love. All of our emotions depend on chemicals produced in the body. Among the most important for our emotions are the neurotransmitters **serotonin**, **epinephrine (adrenalin)**, and **norepinephrine**, along with **oxytocin** and the **steroid hormones**.

- Serotonin is linked with feelings of depression.
- Epinephrine is the hormone that accompanies fear.
- Norepinephrine becomes more abundant in anger.
- Oxytocin has been associated with attachment and feelings of interpersonal attraction.
- Steroid hormones (the same ones abused by some bodybuilders and other athletes) also exert a powerful influence on emotions.

In addition to their effects on muscles, steroids act on nerve cells, causing them to change their excitability. This is a normal part of the body's response to emergency situations. But when steroid drugs are ingested over extended periods, these chemicals maintain the body in an artificial state of emergency. Brain circuits, especially those associated with arousal, threat, stress, and strong emotions, remain on high alert. The result can be "roid rage" (Daly and others, 2003; Miller and others, 2002).

In the meantime, let's see how maintaining a certain level of emotional arousal over a short period of time helps you achieve your best performance in athletics, on the job, and even during your next psychology exam.

# 9.11:  Arousal, Performance, and the Inverted U

**Objective:**  **Explain the inverted U function and how it relates to sensation seekers**

Athletes always want to be "up" for a game—but how far up should they be? Cheering sports fans might think that increased arousal will always improve performance—but that is not necessarily true. Too much arousal can make an athlete "choke" and the performance falter. The same is true when you take an examination. Up to a point, increasing levels of arousal can motivate you to study and to recall what you studied. (Remember the research showing that emotion can enhance memory?) Unfortunately, too-high levels of arousal can cause test anxiety and poor performance.

This complex relationship between arousal and performance has been studied both in laboratory animals and in humans under all sorts of conditions. For example, in experiments on animal learning, the curve plotting the performance of hungry rats working to get a food reward first rises and then later declines with increasing arousal. The same pattern holds for humans in a variety of circumstances, including musical performances, neurosurgery, athletic contests, and final examinations.

Psychologists call this the **inverted U function** (so named because the graph resembles an upside-down letter U, as you can see in Figure 9.11).

In general, there is an optimum level of arousal for best performance: Either too little or too much arousal can impair performance. Think about it: How much pressure would you want your dentist to feel while doing your root canal? Which brings us to a second important point.

The optimum level of arousal varies with the task. As you see in the figure, it takes more arousal to achieve peak performance on simple tasks or on tasks in which responses have been thoroughly rehearsed than it does on complex tasks or those that require much deliberate thinking and planning as the situation develops. So it should not surprise you that cheers and high levels of arousal are more likely to boost performance for an entertainer than for a brain surgeon.

Finally, the amount of stimulation needed to produce optimal arousal also varies with the individual. In

**Figure 9.11**  The Inverted U



| Easy or Well-practiced Task | Moderately Difficult Task | Difficult or Complex Task |

fact, some people seem to thrive on the thrill of danger-ous sports, such as rock climbing and skydiving—activities that would produce immobilizing levels of arousal in most of us. Marvin Zuckerman (2004), who has studied people he calls **sensation seekers**, believes that such individuals have a biological need for high levels of stimulation. Such people are sometimes called "adrenaline junkies." Psychologist Frank Farley also refers to them as Big T (thrill-seeking) personalities, who he believes are prominent in sports, business, science, and art. Einstein was a Big T "mental personality," says Farley (Munsey, 2006). Research suggests that the underlying biology involves not just adrenalin but the brain's dopamine pathways (Bevins, 2001). So, where on the "inverted U" would Marcus Mariota want to be on game day?

You can test your own sensation-seeking tendencies with Zuckerman's scale, found in the *Do It Yourself!* box.

# Do It Yourself!
## Are You a Sensation Seeker?

Different people seem to need different levels of emotional arousal. Marvin Zuckerman argues that "sensation seekers" have an unusually high need for stimulation that produces arousal. In addition to the need for thrills, sensation seekers may be impulsive, engage in risky behaviors, prefer new experiences, and be easily bored (Kohn and others, 1979; Malatesta and others, 1981; Zuckerman, 1974).

From your score on the Sensation Seeking Scale below, you can get a rough idea of your own level of sensation seeking. You may also want to give this scale to some of your friends. Do you suppose that most people choose friends who have sensation-seeking tendencies similar to their own? Wide differences in sensation-seeking tendencies

may account for strain on close relationships when one person is reluctant to take the risks that the other actively seeks.

## The Sensation-Seeking Scale

Choose A or B for each item, depending on which response better describes your preferences. The scoring key appears at the end.

1.  A  I would like a job that requires a lot of traveling.
    B  I would prefer a job in one location.
2.  A  I am invigorated by a brisk, cold day.
    B  I can't wait to get indoors on a cold day.
3.  A  I get bored seeing the same old faces.
    B  I like the comfortable familiarity of everyday friends.
4.  A  I would prefer living in an ideal society in which everyone is safe, secure, and happy.
    B  I would have preferred living in the unsettled days of our history.
5.  A  I sometimes like to do things that are a little frightening.
    B  A sensible person avoids activities that are dangerous.
6.  A  I would not like to be hypnotized.
    B  I would like to have the experience of being hypnotized.
7.  A  The most important goal of life is to live it to the fullest and experience as much as possible.
    B  The most important goal of life is to find peace and happiness.
8.  A  I would like to try parachute jumping.
    B  I would never want to try jumping out of a plane, with or without a parachute.
9.  A  I enter cold water gradually, giving myself time to get used to it.
    B  I like to dive or jump right into the ocean or a cold pool.
10. A  When I go on a vacation, I prefer the comfort of a good room and bed.
    B  When I go on a vacation, I prefer the change of camping out.

**11.** A  I prefer people who are emotionally expressive even if they are a bit unstable.

   B  I prefer people who are calm and even tempered.

**12.** A  A good painting should shock or jolt the senses.

   B  A good painting should give one a feeling of peace and security.

**13.** A  People who ride motorcycles must have some kind of unconscious need to hurt themselves.

   B  I would like to drive or ride a motorcycle.

**Scoring Key:** Each of the following answers earns one point: 1A, 2A, 3A, 4B, 5A, 6B, 7A, 8A, 9B, 10B, 11A, 12A, 13B. Compare your point total with the following norms for sensation seeking:

   **0–3:** Very low
   **4–5:** Low
   **6–9:** Average
   **10–11:** High
   **12–13:** Very high

# 9.12: Theories of Emotion: Resolving Some Old Issues

**Objective:**  **Evaluate each of the major theories of emotion**

Let's return to the hungry bear example: Suppose that you have the misfortune to encounter our bear while on your way to class one morning. We will bet that you will experience the emotion of fear.

But what internal process actually produces the *feeling* of fear? Does it come from the thought, "Uh-oh. I'm in danger"? Or does it come from sensing your racing heart and wrenching gut? (And, you may also be wondering, why would anyone care where emotions come from?)

In response to the last question: Psychologists have long argued over the relationship between emotion, cognition, and physical responses—not only out of intellectual curiosity but also because an understanding of emotion is a key to finding effective treatments for certain emotional problems, such as panic attacks and depression, as well as the everyday problems of anger, envy, and jealousy. Should we try to treat anger, for example, by targeting angry thoughts? Or should we focus on angry behaviors or, perhaps, on the visceral responses that accompany anger?

Recent discoveries in neuroscience have helped us resolve some long-disputed issues surrounding the interaction of biology, cognition, and behavior in our emotions (Forgas, 2008). Let's look briefly at the controversies and how new insights have begun to resolve them.

## 9.12.1: Do Our Feelings Come from Physical Responses?

In the early days of psychology, just over a century ago, William James taught that physical sensations underlie our feelings. "We feel sorry because we cry, angry because we strike, afraid because we tremble," James said (1890/1950, p. 1006). As for your response to the bear, James argued that you would not run because you are afraid, but that *you would feel afraid because you run.* While this statement may appear absurd on its face, James was no fool. He knew that emotion was more than just feelings. What he was really saying was something quite sensible—that emotions require a *combination* of cognitions and physical sensations—and that *the physical sensations are the feelings.* In James's (1884) own words:

> Without the bodily states following on the perception [of the bear], the latter would be purely cognitive in form, pale, colourless, destitute of emotional warmth. We might then see the bear, and judge it best to run, receive the insult and deem it right to strike, but we could not actually *feel* afraid or angry (pp. 189–190).

This view, simultaneously proposed by Danish psychologist Carl Lange, became known as the **James–Lange theory**.

## 9.12.2: Or Do Our Feelings Come From Cognitions?

Other scientists, notably Walter Cannon and Philip Bard, objected that physical changes in our behavior or our internal organs occur too slowly to account for split-second emotional reactions, such as those we feel in the face of danger. They also objected that our physical responses are not varied enough to account for the whole palette of human emotion. In their view, referred to as the **Cannon–Bard theory**, cognitive appraisal of a situation (the hungry bear again) simultaneously produces both the emotional feeling (fear) and the physical response (running away).

**WHICH SIDE WAS RIGHT?**  It turns out that each had part of the truth. On the one hand, modern neuroscience has confirmed that our physical state can influence our

emotions—much as the James–Lange theory argued (LeDoux, 1996). In fact, you may have noted how your own physical state affects your emotions, as when you get edgy feelings after drinking too much coffee or become grumpy when hungry. In a similar fashion, psychoactive drugs, such as alcohol or nicotine or Prozac, influence the physical condition of the brain and hence alter our moods.

Other support for the James–Lange theory comes from the twin discoveries of (a) *the unconscious emotional processing pathway* and (b) the fact that *the brain remembers physical states associated with emotional events.* These memories are the **somatic markers** we mentioned earlier (Damasio, 1994; Niedenthal, 2007). So, when you see the bear lumbering toward you, your brain very quickly conjures a body-memory of the physical response it had previously experienced in a threatening situation. This *somatic-marker hypothesis*, then, effectively counters Walter Cannon's objection that physical changes in the body occur too slowly to cause our feelings—because the somatic marker of emotion resides in the brain itself.

On the other hand—and in support of the Cannon–Bard view—emotions can also be aroused by external cues detected by either the conscious or the unconscious emotional system. Thus, emotion can result from conscious thought (as when you fret over an exam) or from unconscious memories (as when you feel disgust at the sight of a food that had once made you sick). Incidentally, cognitive psychologists now believe that both depression and phobic reactions can result from conditioned responses of the unconscious emotional system.

## 9.12.3:  The Two-Factor Theory

As we noted, you can make yourself emotional just by thinking about your problems and fears, as any student with "test anxiety" will testify. The more you think about the dire consequences of failing a test, the more the anxiety builds. "Method" actors, like the late Marlon Brando, have long exploited the power of cognition to make themselves feel real emotions on stage. They do so by recalling an incident from their own experience that produced the emotion they want to portray, such as grief, joy, or anger.

Stanley Schachter's (1971) **two-factor theory** adds an interesting twist to the role of cognition in emotion. His theory suggests that the emotions we feel depend on our appraisal of both (a) our internal physical state and (b) our perception of the situation. He discovered, however, that strange things occur when these two factors conflict—as they did in a classic study of emotion, which enterprising students may want to replicate in order to spice up their romantic lives.

An attractive female researcher positioned herself near the end of a footbridge and approached males who had just crossed, asking them to respond to a questionnaire. On one occasion she selected a safe, sturdy bridge; another time, a wobbly suspension bridge across a deep canyon. The latter was deliberately selected to elicit a bit of physical arousal. The researcher, pretending to be interested in the effects of scenery on creativity, asked the men to write brief stories about a picture. She also invited them to call her if they wanted more information about the study.

The Results: As predicted, the men who had just crossed the wobbly bridge (and were, presumably, more physically aroused by the experience) wrote stories containing more sexual imagery than those who used the safer structure (as judged by experienced interpreters of the *Thematic Apperception Test*). Incidentally, four times as many of them called the attractive female researcher "to get more information"! The experimenters concluded that the men who had crossed the shaky bridge interpreted their increased arousal as emotional attraction to the interviewer (Dutton & Aron, 1974).

Before you rush out to find the love of your life on a wobbly bridge, we must caution you, numerous attempts to test the two-factor theory have supported it—but only under certain conditions (Leventhal & Tomarken, 1986; Sinclair and others, 1994). Normally, external events confirm what our biology tells us, without much need for elaborate interpretation—as when you feel disgust at smelling an unpleasant odor or joy at seeing an old friend. Only when we experience physical arousal from not-so-obvious sources, such as exercise, heat, drugs, or a wobbly bridge, may we become confused about the source of our arousal. Such **misattribution** is most likely in a complex environment where many stimuli are competing for our attention and when we have faulty information about our physical arousal (see Figure 9.12, p. 354).

---

**WRITING PROMPT**

**Positive Feelings for Brussels Sprouts**

Although many people don't like to eat Brussels sprouts, let's suppose you absolutely love them, because your grandmother always made them when you visited her house, and you loved the time you spent there with her. Indicate which of the three theories of emotion (James-Lange, Cannon-Bard, or Schacter's theory) best accounts for your positive feelings for Brussels sprouts, and explain why.

▶   The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

**Figure 9.12** Theories of Emotion Compared

**Theories of Emotion**

**James–Lange Theory:** Every emotion corresponds to a distinctive pattern of physiological arousal.

Stimulus
-snake → Physiological arousal
-trembling
-increased heart rate → Emotion
-fear

**Cannon–Bard Theory:** Emotions arise from a cognitive appraisal (interpretation) of the stimulus. (This theory was proposed as an alternative to the James–Lange theory because Cannon and Bard believed that emotions occur too quickly to be the result of physiological arousal, as the James–Lange theory asserted.)

Stimulus
-snake → Cognitive
appraisal → Physiological arousal
-trembling
-increased heart rate

→ Emotion
-fear

**Schacter's Two-Factor Theory:** Emotions arise from a cognitive interpretation of the stimulus *and* physiological arousal. Sometimes, however, the person attributes feelings of arousal to one stimulus (the snake), even though the arousal has really been caused by another stimulus—e.g., caffeine or, as in the Capilano Bridge study, having just crossed the swinging bridge. (Dutton & Eron, 1974).

Arousing stimulus to which the person does not attribute the arousal (e.g., caffeine, swinging bridge)

? ▪ ▪ ▪ ▶ Physiological arousal
-trembling
-increased heart rate

Stimulus
-snake →

→ Cognitive appraisal → Emotion
-fear

# 9.13: How Much Control Do We Have Over Our Emotions?

**Objective:** Describe the components of emotional intelligence, and explain whether or not it can be learned

The ability to deal with emotions is important in many professions. Physicians, nurses, firefighters, police officers, and clinical psychologists, for example, must all be able to comfort others, yet maintain a "professional distance" when dealing with disability and death. Emotional control can also be desirable to mask or modify what you are feeling in social situations. So, if you dislike a professor, you might be wise to conceal your true emotions. Even in leisure activities, like playing poker, you will be most successful if you control your emotional responses. So is this a skill that can be learned—or is it innate?

## 9.13.1: Emotional Intelligence

Neuroscientist Richard Davidson finds that people have a characteristic "**emotional style**," which mean that they differ in their emotional responses, much as people differ in their personality traits (Davidson & Begley, 2012; Winerman, 2012). But for psychologists Peter Salovey and John Mayer (1990) the most interesting ways that people differ emotionally involves a set of characteristics they call *Emotional Intelligence* **(EI)**. They are quick to point out that this ability is not simply happiness, optimism, or high self-esteem (Salovey & Grewal, 2005; Mayer and others, 2008). Rather, they insist, the term **emotional intelligence** should be reserved for the combination of four abilities:

- *Perceiving emotions*—The ability to detect and decipher emotions in oneself and others
- *Using emotions*—The ability to harness one's emotions in the service of thinking and problem solving

- *Understanding emotions*—The ability to comprehend the complex relationships among emotions, such as the relationship between grief and anger or how two people can have different emotional reactions to the same event
- *Managing emotions*—The ability to regulate one's own emotions and influence those of others

As Salovey and Grewal suggest, not only are those with high emotional intelligence tuned in to their own emotions and those of others, but they can also manage their negative feelings and curtail inappropriate expressions of their impulses.

But can we assess EI, much as we test for traditional IQ?

## 9.13.2: The Predictive Power of Impulse Control

It turns out that emotional intelligence manifests itself at an astoundingly early age, when it can indeed be measured by Stanford psychologist Walter Mischel's ingenious "marshmallow test." Daniel Goleman (1995) describes the procedure:

> Just imagine you're four years old, and someone makes the following proposal: If you'll wait until after he runs an errand, you can have two marshmallows for a treat. If you can't wait until then, you can have only one—but you can have it right now. (pp. 80–81)

How did young children actually respond to the temptation of a single, tempting marshmallow placed before them? Goleman continues:

> Some four-year-olds were able to wait what must surely have seemed an endless fifteen to twenty minutes for the experimenter to return. To sustain themselves in their struggle they covered their eyes so they wouldn't have to stare at temptation, or rested their heads in their arms, talked to themselves, sang, played games with their hands and feet, even tried to go to sleep. These plucky preschoolers got the two-marshmallow reward. But others, more impulsive, grabbed the one marshmallow, almost always within seconds of the experimenter's leaving the room on his "errand." (pp. 80–81)

**WATCH** A Recreation of the "Marshmallow Experiment"

One of your authors, Dr. Philip Zimbardo, recreates his colleague Walter Mischel's famous experiment, designed to see how children try to risk temptation.

These results show that differences in EI do appear at a young age. But are they innate? And do they persist?

## 9.13.3: The Persistence of Emotional Intelligence

When these same children were tracked down in adolescence, and again later in their 40s, the amazing predictive power of the marshmallow test was revealed (Casey and others, 2011; Mischel, 2014). As a group, those who had curbed their impulse to grab the single marshmallow were, as adolescents, better off on all counts. They had become more self-reliant, more effective in interpersonal relationships, better students, and better able to handle frustration and stress. In contrast, the children who had caved to temptation had adolescent lives marked by troubled relationships, shyness, stubbornness, and indecisiveness. They also were much more likely to hold low opinions of themselves, to mistrust others, and to be easily provoked by frustrations. In the academic sphere, they were uninterested in school. Even more amazing was the discovery that marshmallow test performance correlated with SAT scores: Those who, as 4-year-olds, were able to delay gratification scored, on the average, 210 points higher on the SAT than did their counterparts who had grabbed the single marshmallow years earlier. And finally, new research shows clear differences in brain scans of the two groups (Casey and others, 2011; Chamberlin, 2011).

The usefulness of the marshmallow test, of course, is limited to young children. But other, more sophisticated measures have been developed for use with older children and adults (see Figure 9.13).

**Figure 9.13**  Sample Item From a Test of Emotional Intelligence

Shown is an item similar to those found on the Mayer-Salovey-Caruso Emotional Intelligence Test. Respondents are asked to click on the number on each scale that corresponds to the emotional state of the person shown in the photo.



The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT), for example, seems to test essentially the same abilities, predicting satisfaction with social relationships among college students, deviant behavior in male adolescents, marital satisfaction, and success on the job (Salovey & Grewal, 2005).

But, cautions John Mayer (1999), emotional intelligence tests are not always consistent over time. The data show obvious changes in some people as they mature. Nor should we think of emotional intelligence as a replacement for traditional IQ scores. Rather, says Mayer, EI is merely another variable that can help us refine our understanding of the differences among people.

### 9.13.4:  The Nature and Nurture of Emotional Intelligence

Now let's return to the question with which we began this discussion: *Is emotional intelligence a characteristic fixed by nature, or is it nurtured by experience?*

A group of psychologists led by Joseph Durlak conducted a massive review of more than 200 school programs designed to develop emotional intelligence, which they also called social and emotional learning or SEL (Durlak & Weissberg, 2011; Durlak and others, 2011). These programs focused on such things as interpersonal problem-solving, goal-setting, stress-management, empathy, and decision-making. All involved both specific instruction and active student participation, in which appropriate responses to, say, a playground conflict are modeled by teachers and then practiced by students. The findings are worth quoting:

> SEL [emotional intelligence] programs led to significant improvement in students' social and emotional skills, their attitudes about themselves and their school, and their social and classroom behavior. SEL programs were also associated with significant reductions in students' conduct problems such as classroom misbehavior and aggression, and their emotional distress reflected in symptoms of anxiety, depression or stress. (p. 2)

An especially important finding was that these gains did not come at the expense of academic improvement. They continued:

> Participation in SEL programs was also associated with gains in achievement test scores and school grades that corresponded to an 11th-percentile point gain in academic achievement. . . . Moreover, the positive findings were present for students in elementary, middle and high school, in schools located in urban, rural and suburban areas and in schools serving ethnically and culturally diverse student bodies. (p. 2)

The takeaway message, then, is that while emotions do sometimes slip out of control, we are not simply at their mercy. Emotional understanding and control are skills that can be acquired (Clifton & Myers, 2005).

A few critics point out, however, that emotional control may have a dark side. Just as some people get into trouble when they let their emotions—particularly negative emotions—go unchecked, others take emotional control to the opposite extreme. They become so guarded that they never convey affection, humor, or honest displeasure. Studies also show that overcontrolling emotions interferes with memory for emotionally charged events (Carpenter, 2000; Richards & Gross, 2000). Before we launch a program of encouraging emotional control, perhaps we should consider what such training may do to people who already overcontrol their emotions. In fact, research shows that emotionally healthy people know how both to control and to express their emotions—and when it is appropriate to do so (Bonanno and others, 2004).

### 9.13.5:  Let It Out: A Dangerous Myth

Experts do agree that the public clings to some dangerous misinformation about venting anger, a process also known as *catharsis*. Many people believe that "bottling up" emotions is the cause of uncontrollable emotional outbursts, but this belief is at odds with the truth. Neither is it very emotionally intelligent! In fact, throwing a tantrum, or even a coffee cup, to "get it out of your system" is likely to bring only the most fleeting feeling of satisfaction, while prolonging arousal. And because it amounts to practice at being angry, it can actually make you *more* likely to have an explosive reaction the next time (Tavris, 1989, 1995).

A saner and safer strategy is to keep your feelings to yourself, at least until the passion of your anger has subsided and you can be more rational about the nature of your real complaint and what might be done to solve the problem (Tavris, 1989, 1995). Often, all it takes to defuse a tense and angry situation is to communicate the facts and your feelings to the person toward whom you feel anger.

---

**Psychology Matters**

## Detecting Deception

How easy is it for people to conceal their emotions while telling a lie? You might think you can spot deception when someone fails to "look you in the eye" or fidgets nervously. If you think it is that simple, you could be a prime target for a good liar. In fact, most of us are poor lie detectors—or truth detectors, for that matter.

Experts who study deception find that certain nonverbal cues are the best signs of deceit. A person who deliberately tries to hoodwink us may "leak" uncontrolled nonverbal signals of deception. Knowing how to read these cues could help you decide whether a huckster is lying, your physician might be holding back some bad news, or a politician is shading the truth. Keep in mind, however, that the studies of deception are based on probabilities, not certainties. None of this has yet reached the level of an exact science. Still, we can offer some pointers for situations in which even a little help in deception detection might be better than none at all (Adelson, 2004; DePaulo and others, 2003):

- ***Lies require cognitive effort.*** Some lies involve giving false information, as when a used-car seller tells you that a junker is in good working order. In such cases, the effort to hide the truth requires some cognitive effort. This may result in heightened attention (evident in dilation of the pupils), longer pauses in speech (to choose words carefully), and more

constrained movement and gesturing (in an attempt to avoid "giving away" the truth).

- ***Liars may repeat distorted details.*** Analysis of taped criminal confessions shows that a person deliberately distorting the truth tends to repeat details of the story that they have falsified (Dingfelder, 2004c).

- ***Liars who usually tell the truth.*** The ability to "look you straight in the eye" is, in fact, a reasonably good indicator of truth telling—*but only when dealing with people who usually tell the truth.* When they do lie, their amateurish efforts to deceive often show up in averted gaze, reduced blinking (indicating concentration of attention elsewhere), and less smiling. But watch out for the practiced liar who can look straight at you while telling complete fiction.

- ***Arousal may indicate suppression of the truth.*** When a lie involves hiding the truth, rather than fabricating a story—as a good poker player does when holding a straight flush—the liar may become physically and behaviorally more aroused and animated. This becomes evident in postural shifts, speech errors, nervous gestures (such as preening by touching or stroking the hair or face), and shrugging (as if to dismiss the lie). Conversely, arousal may *not* be a good indicator when the liar is enthusiastically telling a whopper.

- ***Watch the body, as well as the face.*** The face is easier to control than the body, so a deceiver may work on keeping a "poker face" but forget to restrain bodily clues. A smart deception detective might therefore concentrate on a speaker's body movements: Are they rhythmic? Are they calculated? Do the hands move freely or nervously?

- ***Culture affects the way we distinguish truth from lies.*** We are more accurate in detecting liars among people in our own culture. Consequently, we may be prone to assuming someone from another culture is lying, even when they are not. For example, one study found that Jordanians are generally more animated than Americans when talking and that Americans may incorrectly perceive this as "nervousness" and judge the Jordanian to be lying (Bond & Atoum, 2000; Dingfelder, 2004c).

- ***The eyes tell more than the mouth.*** The eyes sometimes betray deceivers, especially when they're using the common social deception of trying to look happy or amused when they are not. While our attention may more naturally focus on a smile as an indicator of happiness or amusement, the mouth can be manipulated much more easily than the muscles around the eyes. Is the smile real? Only in genuine grins do the eye muscles crinkle up the skin on either side of the eyes. You can test your ability to tell a real from a fake smile in the *Do It Yourself!* box.

Remember: None of these is a certain indicator of lying; even the experts make mistakes. The real key to effective deception detection, say the experts, is observing a person's behavior over time. Without the chance for repeated observations, you are much less able to judge a person's honesty (Marsh, 1988).

## Do It Yourself!
## The Eyes Have It

Can you tell if people are sincere when they smile at you? Smiles aren't made just with the mouth, but with the whole face, especially the eyes. A real smile is different from a fake one, primarily around the eyes. Specifically, when we feel genuine joy or mirth, the orbicularis oculi muscles wrinkle up the skin around the eyes.

With this in mind, look at the picture smiling faces and see if you can tell which one is the real smile and which one is forced.

# Critical Thinking Applied: Do Lie Detectors Really Detect Lies?

The **polygraph** or "lie detector" test is based on the assumption that people will display physical signs of arousal when lying.[1] Accordingly, most polygraph machines make a record of the suspect's heart rate, breathing rate, perspiration, and blood pressure. Occasionally, voice-print analysis is also employed. Thus, the device really acts as an emotional arousal detector rather than a direct indicator of truth or lies. But does it work? Let's see how a polygraph examination is conducted.

Polygraphers typically employ several tricks of their trade. They may start the interview by persuading the subject that the machine is highly accurate. A common ploy is to ask a series of loaded questions designed to provoke obvious emotional reactions. For example, "Did you ever, in your life, take anything that did not belong to you?" In another favorite technique, the examiner uses a deceptive stimulation procedure, or "stim test," in which the subject draws a card from a "stacked" deck. Then, the examiner pretends to identify the card from the subject's polygraph responses (American Psychological Association, 2004).

When the actual interrogation begins, it will consist of an artistic mix of *relevant questions, irrelevant questions,* and *control questions.* The irrelevant questions ("Are you sitting down right now?") are designed to elicit truthful answers accompanied by a physical response consistent with truth telling. The control questions ("Did you ever lie to your parents?") are designed to elicit an anxious, emotionally aroused response pattern. Then, the examiner can compare the subject's responses to these two types of questions with responses to the relevant questions ("Did you steal the jewels?"). It is assumed that a guilty suspect will give a stronger response to these questions than to the irrelevant and control questions.

## What Are the Critical Issues?

If you are unfamiliar with the controversy surrounding "lie detectors," you should inform yourself on the positions taken by both sides. (Not a bad approach to any issue!) A good way to begin is by typing "polygraph" into your favorite Internet search engine. Your authors have done

this and have searched the scientific literature, as well. Here's what we have turned up.

## The Problem of False Positives and Standards

Without a doubt, wrongdoers do sometimes confess when confronted with polygraph evidence against them. But most people don't realize that the polygraph procedure could just as easily land innocent people in prison and let the guilty walk free (Aftergood, 2000). To illustrate, let's assume that polygraph examinations are 95% accurate. (This is just a guess, because no one really knows how accurate they are.) Now imagine that your company arranges for all 500 of your employees to take a polygraph test to find out who has been stealing office supplies. Suppose also that only about 4% (20 out of 500 people) are really stealing—not an unreasonable estimate. So, if the lie detector test is 95% accurate, it will correctly spot 19 of these 20 thieves. But here's the rub: If the test is 95% accurate, it will also give 5% **false positives**, falsely fingering 5% of the innocent people. Of your 480 innocent employees, the polygraph will inaccurately implicate 24 as liars; that is, *you could end up with more people falsely accused of lying than people correctly accused of lying.* This was borne out in a field study of suspected criminals who were later either convicted or declared innocent. The polygraph results were no better than a random coin flip (Brett and others, 1986).

But that's not the only problem. Remember that polygraph subjects *know* when they are suspects, so some will give heightened responses to the critical questions, even when they are innocent. Conversely, some people can give deceptive responses because they suppress or distort their emotional responses. To do so, they may employ simple physical movements, drugs, or biofeedback training—a procedure in which people learn to control certain biological responses, such as perspiration or heart rate (Saxe and others, 1985). Either way, a polygraph examiner risks incorrectly identifying innocent people as guilty and failing to spot the liars.

An equally serious concern with polygraphy is that there are no generally accepted standards either for administering a polygraph examination or for interpreting its results. Different examiners could conceivably come to different conclusions based on the same polygraph record.

## The Economics and Politics of Polygraphy

We think there is the possibility of bias, stemming from vested economic and political interests. A formidable polygraph industry has an economic interest in convincing the public that polygraph tests can, indeed, distinguish truth tellers from liars. Police and criminal prosecutors also have a political interest in having a "scientific" method of quickly settling cases and getting convictions. Most of

---

[1] This is exactly the opposite of the assumption in the Biblical tale of King Solomon, who had to settle a custody dispute between two women, both of whom claimed the same baby. As the story goes, Solomon decreed that the baby be cut in half and one half awarded to each woman. Observing their different reactions, he decided that the woman who became most agitated was telling the truth. (See 1 Kings 3:16-28)

the "data" supporting the polygraph are actually testimonials from these sources.

## So, What Conclusions Can We Draw About Polygraphy?

The U.S. Congress has outlawed most uses of polygraph tests in job screening and in most areas of the government, except for high-security-risk positions. The National Academies of Sciences (2003) has gone even further in a report saying that the polygraph is too crude to be useful for screening people to identify possible terrorists or other national security risks. Your authors agree.

As far as criminal investigations are concerned, we find a patchwork of laws on the admissibility of polygraph evidence among the states. Few states have gone so far as to impose complete bans on polygraphy. Twenty allow such evidence only on agreement of both sides. In a few states, however, polygraph results are still routinely admissible in court, even against the wishes of the defense (Gruben & Madsen, 2005). So where do you come down on the issue of using the polygraph in criminal cases? Does the fact that a "lie detector" test can sometimes force a confession from a suspect justify its use?

## Alternative Approaches to Deception Detection

The reining-in of polygraph testing has spurred the development of alternative means of detecting dishonesty (Capps & Ryan, 2005; Lane, 2006). Much of this work has been devoted to paper-and-pencil instruments that are often called "integrity tests." How well do these instruments work? Not very well, according to reports by the American Psychological Association and by the U.S. government's Office of Technology Assessment. Like the polygraph, they also suffer from a high false-positive rate.

Paul Ekman—the same one who studies universal facial expressions of emotion—has found that liars often display fleeting "microexpressions" and other nonverbal cues. In one study, Ekman and his colleague Maureen O'Sullivan found that some people are especially good at detecting deception, but they are a small minority. In their tests, most people perform at about the chance level. Still, Ekman and O'Sullivan hope to learn what those most skilled at detecting deception look for and teach that to police officers and other concerned with crime and security issues (Adelson, 2004).

Taking another approach, some researchers have turned to brain scanning techniques to see if they can catch liars (Ross, 2003). A certain brain wave pattern known as P300 has been linked with a variety of attention-getting cues, such as hearing one's name, but studies show it can also be evoked by fibbing. In addition, fMRI images show that lying activates all the brain areas involved in telling the truth, plus several more. This suggests that lying is not something completely separate from the truth but an operation the liar must perform *on* the truth, says psychiatrist Daniel Langleben, all of which raises the concern that there is too much hype and too little solid evidence behind brain-scan-based lie detection (Gamer, 2009; Langleben and others, 2002; Stix, 2008). In addition, some neuroscientists worry about the ethics of peering directly into people's brains to "read" the neural traces of their private thoughts (Pearson, 2006).

The potential advantage of these newer brain-scan techniques is that they bypass the anxiety-response pathway used by polygraphy. By registering neural activity, they get much closer to the person's actual thoughts. But how well do these alternative methods work? Not well enough for the police and the courts—yet.

# Summary: Motivation and Emotion

## Chapter Problem

How can theories of motivation and emotion help us understand unusual and complex people, like Marcus Mariota, our family and friends . . . and, perhaps, even ourselves?

- The subjective nature of motivation has forced psychologists to study the underlying processes indirectly, using a variety of methods, including animal studies, the *TAT*, and brain scans.

- Psychologists have identified many important influences on motivation, including culture, goals, unconscious processes, various biological factors, and social pressures. Rewards, both *intrinsic* and *extrinsic*, are also important for world-class athletes like Marcus Mariota.

- One of the biggest questions involves the priorities we give to our motives—an issue that Maslow addressed in his famous **hierarchy of needs**. Recently, evolutionary psychologists have proposed an updated needs hierarchy. Many athletes, performers, and artists apparently do much of their work in a state of **flow**—a mental state in which the person focuses on an intrinsically rewarding task to the exclusion of all other needs.

- Understanding motivation also requires understanding a person's emotions—because emotions are a class of motives aroused by persons, objects, and situations in the individual's external world. Emotions serve as the "values" we place on alternatives when we make choices and decisions.

## What Motivates Us?

### Core Concept 9.1

**Motives are internal dispositions to act in certain ways, although they can be influenced by multiple factors, both internal and external.**

The concept of **motivation** refers to inferred internal processes that select and direct behavior toward a goal. Motivation also helps explain behavior that cannot be explained by the circumstances alone. Psychologists find it useful to distinguish **intrinsic motivation** from **extrinsic motivation**.

Why do people work? *Reward theory* says they do so to gain the rewards of work, but the more sophisticated **expectancy theory** adds the reasonable expectation of success. David McClelland's theory emphasizes the **need for achievement (*n Ach*)**, a motive important for I/O psychologists concerned about worker motivation and job satisfaction. The need for achievement also correlates with academic success and other accomplishments in life. But just as important as *n Ach* are the *needs for power and affiliation*, said McClelland. Cross-cultural research also shows that societies vary in the intensity of their need for achievement, depending on their tendencies toward **individualism** or **collectivism**.

Psychologists have found that extrinsic rewards can destroy motivation for intrinsically rewarding tasks through **overjustification**. This is not always the case, however, but rather when rewards are given without regard for the quality of performance.

Great achievements usually come from people in a state of **flow**. Those in a flow state are intrinsically motivated by some problem or activity. The use of drugs or alcohol to achieve an artificial flow feeling is not usually effective.

## How Are Our Motivational Priorities Determined?

### Core Concept 9.2

**A new theory combining Maslow's hierarchy with evolutionary psychology solves some long-standing problems by suggesting that functional, proximal, and developmental factors set our motivational priorities.**

Psychology has no successful theory that accounts for all of human motivation. Psychologists have explained biologically based motivation in terms of **instinct theory**, **fixed-action patterns**, **drive theory**, and **homeostasis**. Cognitive psychologists have emphasized **biological motives**. Freud called attention to unconscious motivation and taught that all our motives derive from unconscious sexual and aggressive desires. None of these approaches successfully explains the full range of human motivation, however.

With his influential **hierarchy of needs**, Maslow attempted to explain the priorities in which human motives appear. Critics have, however, pointed out many exceptions to his hierarchy. Recently, evolutionary psychologists have proposed a revision of Maslow's theory suggesting that our "default" motivational priorities can change, depending on developmental factors and on important (proximal) stimuli.

In trying to understand another person's motivation, a good place to start is with extrinsic incentives and threats. In addition, Alfred Adler taught that social motives explain many problem behaviors. Social psychologists combine these notions under the heading of the *power of the situation.*

## Where Do Hunger and Sex Fit into the Motivational Hierarchy?

### Core Concept 9.3

**Although dissimilar in many respects, hunger and sex both have evolutionary origins, and both involve a combination of biological and social needs—but only one is necessary for survival of the individual.**

Hunger is both a biological drive and a psychological motive, best understood by a multiple-systems approach. Americans receive mixed messages from the media, promoting both thinness and calorie-dense foods, which may play a role in disorders such as obesity, **anorexia nervosa**, and **bulimia nervosa**. None of these problems is completely understood, although both social and biological factors are thought to be involved. The problem of obesity has become an epidemic in America and is rapidly being exported throughout the world. Many people seek to control their appetite and body weight, although

no weight-loss scheme is effective for most people over the long run.

*Will power* is a common term in everyday language, although psychologists avoid it because it suggests a separate faculty of the mind. They prefer *impulse control* or **self-control**, terms that can be more easily explained in reference to brain mechanisms and environmental influences. Recently, researchers have found that impulse control takes a cognitive toll and is reflected in blood sugar levels.

Unlike hunger and weight control, the **sex drive** is not homeostatic, even though sexual motivation is heavily influenced by biology, but learning also plays a role, especially in humans. Particularly since Kinsey's surveys, the scientific study of sexuality has caused controversy in America, even though survey research shows that, over the last half century, Americans have become more liberal in their sexual practices. Masters and Johnson were the first to do extensive studies of sexual behavior in the laboratory, finding that the **sexual response cycles** of men and women are similar. More recently, Peplau has emphasized differences in male and female sexuality. Those adhering to the evolutionary perspective argue that differences in male and female sexuality arise from conflicting mating strategies and from the large biological investment women have in pregnancy—both of which encourage more promiscuity in men.

As Maslow's hierarchy did, the new evolution-based hierarchy generally gives hunger priority over sex, although the hierarchy is fluid.

The greatest puzzle about sexuality centers on the origins of **sexual orientation**, especially the factors leading to **heterosexuality**, **homosexuality**, and **bisexuality**. Most experts agree that sexual orientation involves a combination of biological, environmental, and social factors, although much of the research has focused on biology. Since the 1970s, homosexuality has not been viewed as a disorder by psychologists and psychiatrists.

## How Do Our Emotions Motivate Us?

### Core Concept 9.4

**Emotions are a special class of motives that help us attend to and respond to important (usually external) situations and communicate our intentions to others.**

**Emotion** is a process involving four main components: physiological arousal, cognitive interpretation, subjective feelings, and behavioral expression. The subjective feeling, says Damasio, stems from a **somatic marker**, consisting of a memory of the body's reaction to an emotional situation.

Emotions can also act as motives. From an evolutionary standpoint, they help us approach or avoid recurring stimuli that are important for survival and reproduction. Socially, emotional expressions serve to communicate feelings and intentions, apparently aided by "mirror neurons."

Most experts posit a limited number of *basic emotions* that, in combination, produce a larger number of *secondary emotions*. At least seven basic facial expressions of emotion are universally understood across cultures, although these can be modified by culture-specific **display rules**. These universal emotions are probably biologically based.

Some emotional differences between males and females have biological roots. This is seen in differential rates of certain emotional disorders, as well as more frequent displays of anger in men. On the other hand, cultural differences demonstrate that some gender differences in emotion are learned. Specifically, different cultures teach men and women different display rules about controlling emotional expression. Despite the differences, neither sex can be said to be more emotional than the other.

## What Processes Control Our Emotions?

### Core Concept 9.5

**The discovery of two emotion-processing systems in the brain—one conscious and the other unconscious—has shed new light on some old controversies about emotion and cognition.**

Neuroscience has revealed two distinct emotion systems in the brain. One, a **fast response system**, operates mainly at an unconscious level and relies on deep limbic structures, especially the amygdala. The other, the **slow response system**, involves conscious processing in the cortex. The pathways intersect in the **ventromedial prefrontal cortex**. Emotions also involve visceral changes in response to messages transmitted by the autonomic nervous system and the hormone system. In addition to the two emotion pathways, the two hemispheres have a **lateralization of emotion** by which each specializes in processing a different class of emotion.

The inverted U theory describes the complex relationship between emotional arousal and performance: Increasing arousal improves performance—but only up to a certain optimum level of arousal, which depends on the complexity of the task. **Sensation seekers** seem to have an especially high need for arousal.

Understanding the two emotion systems has begun to resolve some long-standing controversies involving the roles of cognition and physical responses in emotion. The

**James–Lange theory** argued that physical sensations and physical responses produce emotional feelings. The opposing **Cannon–Bard theory** stated that our cognitive appraisal produces both emotions and the accompanying physical response. Stanley Schachter's **two-factor theory** suggested that emotions are the result of cognitive appraisal of both our internal physical state and the external situation. The research shows that all three viewpoints have a share in the truth.

Each person has a distinctive **emotional style**, involving six basic dimensions—including one's ability to control emotional expression. **Emotional intelligence**, the ability to keep one's emotions from getting out of control, is vital for maintaining good social relationships. It is distinct from the abilities measured by traditional IQ tests. Increased emotional control can be achieved by learning, as demonstrated in anger management programs. Tests of emotional intelligence show that those who score highly tend to succeed in social situations.

## Critical Thinking Applied: Do Lie Detectors Really Detect Lies?

"Lie detectors" work on the assumption that people will show physical signs of arousal when lying. While **polygraph** examiners sometimes extract confessions when they convince suspects that the test can show them lying, the evidence does not indicate that the results are always reliable. Particularly troubling is that, under some circumstances, the polygraph test can identify more **false positives** than actual liars. Alternative approaches that use facial expressions or brain scans are being explored, but so far they have not been validated.

# Chapter 10
# Personality



Seeing oneself as a unique person in the process of becoming our own special self.

## Core Concepts

**10.1** Personality is shaped by the combined forces of biological, situational, and mental processes—all embedded in a sociocultural and developmental context.

**10.2** The dispositional theories all suggest a small set of personality characteristics, known as temperaments, traits, or types, that provide consistency to the individual's personality over time.

**10.3** While each of the process theories emphasizes different forces in the development of personality, all portray personality as the result of both internal mental processes and social interactions.

**10.4** Our understanding of ourselves and others is based on implicit theories of personality and our own self-narratives—both of which are influenced by culture.

- *Do you think of yourself as unique?*
- *Or are you pretty much the same as most other people?*
- *Can you often predict what things you will or won't do in the coming week or year based on your sense of who you are and what you stand for?*

- *Do your friends and family see you as consistent and predictable in how you behave across different settings?*

Most people assume that their typical behavior is mostly based on inner determinants—genes, character, and personality traits—that, taken together, form their Core Self. In

fact, the idea that each of us is a distinct individual with a unique self that makes us different from everyone else is an assumption we rarely question. But how do we become that individual?

Curiously, this question took root in psychology because of a singular woman who struggled all her life to become herself in a world that tried repeatedly to deny her. What was her outrageous desire? Simply to be recognized as a competent scholar—but in an all-male academic world that dismissed her because of her "unacceptable" gender (Calkins, 1906, 1930; DiFebo, 2002).

Mary Calkins came into psychology through the back door. In the late 1800s, Wellesley College—for female students—recognized her as an outstanding teacher and offered her a job in the emerging discipline of psychology, provided she could get some additional training (a practice not unusual at women's colleges at the time). But finding a graduate school that would take a woman was not easy in that era. Nevertheless, nearby Harvard University was a possibility, because the legendary pioneering psychologist William James wanted her to be his student. There was only one obstacle: Harvard refused to accept female students. Its president, Charles Eliot, strongly believed in separate education for men and women. However, he relented under pressure from James and other members of the psychology department—under the condition that Mary Calkins attend classes informally and not ever be eligible for a Harvard degree. (Harvard refused to award doctorates to women until 1963!)

Thus, Calkins began her graduate work at Harvard, and by the spring of 1895 had finished her course work and completed groundbreaking research on memory, which became her doctoral dissertation, *Association: An Essay Analytic and Experimental*. She developed the paired-associates memory test, which became a standard in the field. Fully supportive of her work, the rebellious psychology faculty at Harvard held an unauthorized oral defense of her dissertation and petitioned the board of directors to award her a Ph.D. William James praised her performance as "the most brilliant examination for the PhD that we have had at Harvard." Amazingly, the directors refused. Incensed, William James told Calkins that Harvard's action was "enough to make dynamiters of you and all women" (Furumoto, 1979, p. 350). Instead of blowing up the college, though, she persevered throughout her lifetime in a tireless pattern of learning, research, and writing.

Despite being denied the doctoral degree she had earned, Mary Calkins returned to Wellesley where, as promised, she was welcomed as a teacher of psychology. A productive scholar as well as a dedicated teacher, she eventually published more than 100 articles and four books, including her best-selling text *An Introduction to Psychology*. At Wellesley, she helped organize one of the first psychology research laboratories in America. Mary also pioneered two other domains within psychology: dream analysis (which Freud later acknowledged) and her main passion—the psychology of the Self. In 1905, she became the first woman president of the American Psychological Association, and later, the first woman president of the American Philosophical Association. In her upbeat autobiography, Mary acknowledges all the help she received from colleagues on her life journey, and never disdains all those who refused to treat her with the respect that her performances should have earned her. Mary Calkins died in 1930, at age 67.

# Personality Is the Thread of Consistency Over Time and Across Life's Situations

Mary Calkins's pattern of persistent motivation to learn and succeed, despite the obstacles spanning her entire professional life, illustrates the central theme of this chapter. **Personality** consists of all the psychological qualities and processes that bring continuity to an individual's behavior at different times and across different situations. It's a broad concept we could also describe as the thread of consistency that runs through our lives (Cervone & Shoda, 1999). And should this thread of consistency break, it may leave a personality fraught with the inconsistencies seen, for example, in personality disorders or more extreme mental impairments such as schizophrenia or dissociative identity disorder (formerly known as multiple personality disorder). The puzzle facing the personality psychologist requires fitting together all the diverse pieces that make up the individual. It involves an integration of everything that is fundamental to human thought, feeling, and action—learning, perception, development, motivation, emotion, and more general processes—in the attempt to understand the individual as a unified whole.

In some respects, personality is simple because we are all alike in certain ways. We generally prefer pleasure to pain, get excited at times, are bored by sameness, seek meaning in our lives, and often judge ourselves by the standards set by the behavior of others. But beyond such obvious similarities, we are also unique individuals—each unlike anyone else. Just as there are no two fingerprints exactly alike among the billions of people worldwide, so too there are really not any two people exactly alike—not even identical twins. So personality is also the psychology of *individual differences*—what makes

us think, feel, and act differently from most others functioning in the same behavioral situation. As we study this puzzle, we will use Mary Calkins's story to illustrate how personality psychologists try to make sense of this fascinating process.

> **CHAPTER PROBLEM:** **What influences shaped the unique behavioral patterns, high achievement motivation, consistency over time and place, and hardiness to cope with stresses that we see in the personality of Mary Calkins?**

Did the people around Mary and the events in her life shape her personality? Those events were so often beyond her control that we must consider another possibility: that her courage and determination arose more from internal traits—from her basic makeup, including her values, attitudes, work habits, and self-reinforcing tendencies. You may recognize these two broad alternatives as another variation on the basic nature–nurture question so central to developmental psychology. The answer, of course, lies with both: Experience *and* innate factors shaped Mary Calkins's personality, just as they shape yours and ours. In this chapter, we will examine several theoretical explanations for what personality is, how it develops, and how it functions. As we do so, you will find that some theories place more emphasis on nature while others focus on nurture. You will also find that particular theories are suited to dealing with particular kinds of personality issues. For example:

- If what you need is a snapshot of a person's current personality characteristics—as you might want if you were screening job applicants for your company—a theory of *temperaments*, *traits*, or *types* may be your best bet.

- If your goal is to understand someone as a developing, changing being—a friend, or returning war veteran, who asks you for advice, perhaps—you will probably find one of the *psychodynamic*, *humanistic*, *existential*, or *social-cognitive theories* of personality most helpful.

- If you are most interested in how people understand each other—as you might be if you were doing marriage counseling or conflict management—you will want to know the assumptions people make about each other; that is, you will want to know their *implicit theories of personality.*

- And, if you are wondering whether people understand each other in the same ways the world around, you will want to know about the *cross-cultural* work in personality that is infused throughout the chapter.

We begin our exploration of personality now with an overview of the varieties of forces that have shaped us all.

# Key Question: What Forces Shape Our Personalities?

## Core Concept 10.1

**Personality is shaped by the combined forces of biological, situational, and mental processes—all embedded in a sociocultural and developmental context.**

Personality makes us not only human but also different from everyone else. Thus, we might think of personality as the "default settings" for our individually unique patterns of motives, emotions, and perceptions along with our learned schemas for understanding ourselves and our world (McAdams & Pals, 2006). *Personality* is also the collective term for the characteristics that make us who we are. All of this, in turn, is embedded in the context of our developmental level, social relationships, and our culture. In other words, virtually every aspect of our being comes together to form our personality (see Figure 10.1). Our core concept captures this idea:

> Personality is shaped by the combined forces of biological, situational, and mental processes—all embedded in a sociocultural and developmental context.

**Figure 10.1** Personality as the Psychology of the Whole Person

Human personality is an interaction of many psychological processes: our evolutionary history, our individual biological makeup, and our developmental progression—all unfolding in an environment that includes family, larger social networks (both face to face and virtual), and our culture.



Let's look at each of these elements of personality, beginning with an overview of the forces of biology and evolution.

By the end of this section, you will be able to:

**10.1** **Assess the influence of biology on human nature and personality**

# 10.1: Biology, Human Nature, and Personality

**Objective:** Assess the influence of biology on human nature and personality

Put two laboratory rats in a cage and electrify the floor with repeated shocks, and the rats will attack each other. We can see much of the same behavior in humans, who lash out at any convenient target when they feel threatened. Thus, in the early 20th century, the number of lynchings of Black citizens in the southern United States rose and fell in a mirror-image response to the state of the economy—particularly the price of cotton. When the economy was down, those murders rose, and then declined again in prosperous times. And in the 1930s, Nazi leader Adolf Hitler placed the blame for Germany's economic troubles on Jews, against whom he turned Germany into a racist Nazi state that embraced the Holocaust—the systematically orchestrated genocide of millions of European Jews.

These are all examples of what Sigmund Freud called *displacement of aggression.* Sometimes we call it *scapegoating,* after the ancient Hebrew ritual of symbolically transferring the sins of the tribe to a goat that was then driven out into the desert to die. Displacement was also what William James was talking about when he suggested that Harvard's refusal to give Mary Calkins the degree she earned was "enough to make dynamiters of you and all women." He meant female terrorists who would feel justified in using dynamite to blow up Harvard University, or at least its sexist male administration. And in our time, suicide bombers die as martyrs for a religious cause while blowing up innocent civilians—their "enemies"—in many nations in the Middle East.

Nothing, of course, can justify mayhem, murder, or genocide—but perhaps we can explain these actions. According to David Barash (2007), human history is the story of those who responded to painful or threatening situations by striking at the nearest target. Those who did so had a clear evolutionary advantage over those who just sat and "took it" because they were less likely to be victims the next time around. They were also more likely to breed and pass along this tendency for aggression and displacement to their descendants.



Is aggression part of human biology? If so, why are some people more prone to aggression than others?

Displacement of aggression is not the only human characteristic that seems to be built into our biology. As we noted earlier, most people prefer pleasure to pain, and sexual pleasure may be at the top of the list for many people. The obvious human propensity for sex and aggression fits with Darwin's idea that we come from a long line of ancestors who were driven to survive and reproduce. Sigmund Freud, picking up this "survival of the fittest" notion, argued that everything we do arises from a sex-based survival "instinct" and an "instinct" for defense and aggression. Other theorists have proposed that personality is based on different motives, such as social motives, that still undoubtedly have some basis in biology. Much like ants and bees, they have pointed out, we humans are "social animals," meaning that our individual survival is enhanced by functioning within group settings.

## 10.1.1: Which View Is Right?

Modern neuroscience and evolutionary psychology suggest that the search for only a few basic urges behind all human behavior is misguided (McAdams & Pals, 2006). The emerging picture is a far messier one. We (that is, our brains) seem to be collections of "modules," each adapted to a different purpose—which may be the reason we have so many different motives, each operating by different rules. Sex, aggression, hunger, affiliation, thirst, and achievement—each may be a separate module in the brain, while simultaneously contributing to the complex entity we call "personality." In all these ways, biology can contribute to human personality.

# 10.2: The Effects of Nurture: Personality and the Environment

**Objective:** Review the role of genes and the childhood environment in shaping personality

Biology and evolution can't explain everything. Even the geneticists grudgingly admit that heredity accounts for only roughly half our characteristics (Robins, 2005). For example, a child whose parents both have schizophrenia, a largely genetically based mental disorder, is likely to develop schizophrenia only 50% of the time. What accounts for the rest of the equation? The rest, broadly speaking, comes from the environment, which molds us according to the well-known principles of behavioral conditioning, cognitive learning, social psychology, and the still-mysterious processes of **epigenetics**.

## 10.2.1: What Environments Make the Most Difference?

Many personality theorists emphasize early childhood experiences: From this perspective, your own personality owes much to your parents, not just for their genes but also for the environment they gave you. At the extreme, children who receive essentially no human contact, as in those abandoned to custodial care in the worst of orphanages, emerge as stunted on virtually every measure of physical and mental well-being (Nelson and others, 2007; Spitz, 1946). In fact, new research reveals that the brains of children who grow up in impoverished environments actually shrink in size—losing brain cells in the thalamus that influence both cognitive abilities and physical survival (Noble and others, 2015).

Another interesting environmental influence on personality is birth order, as the environment for each successive child in a family—from the oldest to the youngest—is somewhat different. Were you the firstborn child? If so, you are more likely than your later-born siblings to end up in a career that requires use of your intellect and high achievement, says development theorist J. Frank Sulloway (1996). Firstborns are more likely to have become U.S. presidents and astronauts, as well. Or are you the youngest? If so, chances are you are more likely to make people laugh than your more sober older siblings. A specific example underscores the point: In a study of more than 700 brothers who played professional baseball, Sulloway found that younger brothers were far more likely to take chances and risks, such as attempting to steal bases, than were their more conservative firstborn siblings. In addition, the younger brothers were also more likely to be successful when they took such risks (Sulloway & Zweigenhaft, 2010). Incidentally, the high-achieving Mary Calkins, as the firstborn of five children in her family, fits the pattern. (We should add that no one believes these patterns *always* hold true; they are merely statistical probabilities that hold on average.)







Fifty-five percent of all U.S. presidents were firstborn, among them Thomas Jefferson, Abe Lincoln, and Barack Obama.

There is some dispute, however, over just how persistent the family environment is, as we encounter the sway of peer pressures in adolescence (Harris, 1995) and develop into our own unique selves as we progress through adulthood. Personality psychologist Walter Mischel (2003), though, asserts that environmental influences typically overwhelm all other effects—including any inborn traits. Just think how often during the day you simply respond to environmental dictates, from the ringing of your alarm clock to the commands of red traffic lights, to school and job requirements, or to social inquiries such as, "How are you?" Is Mischel right? By the end of this chapter, you will have the tools you need to better decide for yourself.

# 10.3: Two Views of Personality: Dispositions and Mental Processes

**Objective:**   **Recognize that personality can be studied by a combination of the dispositional theories and the process theories**

Important as the environment is, we still must pass our experiences through a series of internal mental "filters" that represent core elements of personality. Suppose, for example, that you are an outgoing person—an *extravert*—who prefers to be with other people rather than more solitary. Your sister, however, prefers to spend more time alone practicing music and painting with watercolors. She would be classified as an *introvert.* You will interpret your experiences from your extraverted point of view. Thus, the two of you might have very different experiences while attending the same party. This introvert–extravert dimension exemplifies the *descriptive* approach to personality, focusing on an individual's **dispositions**. Other approaches, called *process theories*, go beyond description to explain personality in terms of internal **personality processes**. For a complete explanation of personality, we need both the *dispositional theories* and *process theories* that we will study throughout this chapter,

# 10.4: Social and Cultural Contributions to Personality

**Objective:**   **Evaluate the way our social and cultural environment shapes our personality**

According to cross-cultural psychologist Juris Draguns (1979), the very concept of personality theory is a Western (Euro-American) invention. So it is not surprising that people who created the most comprehensive and influential theories of personality were trained in the framework of the Western social sciences, with a built-in bias toward individu-

alism and a unique "self" (Guisinger & Blatt, 1994; Segall and others, 1999). Other cultures, however, address the problem of differences among people in their own ways. Most of these non-Western perspectives have their origins in religion (Walsh, 1984). Hindus, for example, see personality as a union of opposing characteristics (Murphy & Murphy, 1968). The Chinese concept of complementary opposite forces, *yin* and *yang*, provides another variation on this same theme.

## 10.4.1: But How Does Culture Influence Personality?

We will see that, in a few respects, personality is much the same across culturesIn other words, we can describe people all over the world in terms of just a few basic personality traits. For instance, people everywhere vary in their level of anxiety and in their tendency to be outgoing or introverted. But there are also components of personality on which cultures themselves exert huge differences—for example, in some cultures people are expected to express anxiety openly, while in others anxiety is to be kept more to oneself. Another, broader, example involves the concepts of **individualism** versus **collectivism**. People in the United States and other Western countries tend to emphasize individualism, which rewards those who stand out from the crowd, and values individual achievement. In contrast, people in the more group-oriented cultures of Asia, Africa, Latin America, and the Middle East emphasize collectivism, which rewards people for fitting in with the group, and values social harmony. So, people raised in individualistic cultures may have personalities that are more self-focused, while the personalities of members of collectivistic cultures would emphasize group needs over individual needs and successes.

**Table 10.1**  Individualism Versus Collectivism Culture
Ten Differences Between Collectivist and Individualist Societies

| Individualism | Collectivism |
|---|---|
| • Everyone is supposed to take care of him- or herself and his or her immediate family only | • People are born into extended families or clans which protect them in exchange for loyalty |
| • "I"-consciousness | • "We"-consciousness |
| • Right of privacy | • Stress on belonging |
| • Speaking one's mind is healthy | • Harmony should always be maintained |
| • Others classified as individuals | • Others classified as in-group or out-group |
| • Personal opinion expected: one person, one vote | • Opinions and votes predetermined by in-group |
| • Transgression of norms leads to guilt feelings | • Transgression of norms leads to shame feelings |
| • Languages in which the word "I" is indispensable | • Languages in which the word "I" is avoided |
| • Purpose of education is learning how to learn | • Purpose of education is learning how to do |
| • Task prevails over relationship | • Relationship prevails over task |

**Figure 10.2** Interesting Examples of Different Rituals and Communal Practices in Three Different Cultural Settings



This woman from Rwanda, like mothers in many African cultures, carries her baby on her back, promoting warmth, comfort, and safety for the child. Although strollers are marketed in Africa, they do not sell well, as African families believe strollers are impersonal, rejecting, and impede bonding.



Respect for elders permeates Hindu culture. Touching elders' feet shows respect. The elder then blesses the younger person with a hand on their head. The ritual is traditionally modeled for young children by their parents and is practiced prior to all important events.

**SOCIAL RELATIONSHIPS AND SUBCULTURES**   And *within* any culture, be it individualistic or collectivistic, social relationships have an enormous impact on personality. To a significant extent, who you are is determined by those with whom you interacted while growing up, including not just your parents but also your siblings, classmates, teachers, and others. And in your teen years, you are what your friends are—pressure is strong to fit in to your peer group's norms. At that time in our development , we often "go along to get along," doing and being what we believe "they" want us to do and be. An interesting new issue to consider is the impact on you of your Facebook friends and

contacts, some of whom you may never actually interact with in real time.

We also align ourselves with various "subcultures," such as skaters, nerds, jocks, gamers, gays, or Christians, which in turn shapes our attitudes and behaviors. As we continue into adulthood, we continue to be influenced by the norms of our culture in how we communicate and interact with others, how we dress, the way we raise our children, and the viewpoints we have toward other groups in our society such as our elders—just to name a few. Thus, your personality is, in part, a creation of other people.

**WRITING PROMPT**

**When Your Ordinary Behavior Seems Deviant to Others**

Is there something you do that often gets misunderstood by some other people, perhaps based on your age, the way you dress, your gender, or some other aspect of your physical appearance?

▶ | The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

## 10.4.2:  Cross-Cultural Differences in Shyness

The interplay of culture and environmental learning is revealed when we examine differences in shyness between Asians and Israelis. Research has shown that in the United States, about 40% of adults considered themselves to be shy people (in 1970 to 1980), but that figure rose to about 60% among Asian-Americans and dropped to about 25% among Jewish-Americans (Zimbardo, 1977). Similar disparities were found when Chinese and Israelis were surveyed in their home countries.

**WHY SUCH A STRIKING DIFFERENCE IN THIS UNIVERSAL TRAIT OF SHYNESS?**   Interviews with parents, teachers, coaches, and children uncovered a simple causal factor: How each culture dealt with a child's successes and failures.

- In many Asian cultures, when a child or anyone tries a task and succeeds, who gets the credit?

  **Answer**: The grandparents, parents, teachers, coaches, and perhaps even Buddha get some credit in that belief system.

- But what if that child fails at a task, then who gets the blame?

  **Answer**: All blame is heaped on the child.

The resulting behavioral style becomes one of low risk taking, cautiousness, and minimizing personal visibility in general; in short, becoming a shy person. "A nail that sticks

out will soon be hammered down" is a theme in those cultures that promote modest reserve.

In Israel, everyone greets the child who fails at an assigned task: all family members are fully ready to take the blame—for not feeding him enough, for not giving her sufficient training, for the unfairness of the competition, and more. But should the child succeed, the heavens open with endless praise. (The Yiddish term is *kvelling*, or making much ado, sometimes about nothing.) Thus, Israeli children are encouraged to take risks, to put both feet forward, and to be outgoing because—as they learn in their culture—there is nothing to lose and everything to gain. This view promotes *chutzpa*, the Yiddish term for supreme self-confidence and audacity—even in the absence of relevant talent. It's a cultural recipe for anti-shyness, to be sure (Carducci & Zimbardo, 1995; Pines & Zimbardo, 1978).

**WATCH** Zimbardo Discusses New View of Shyness



Can you imagine one person who is both a prisoner and a guard at the same time? Can you

Shyness as a Self-Imposed Psychological Prison

## Psychology Matters

## Explaining Unusual People and Unusual Behavior

You don't need a theory of personality to explain why people generally get to work on time, sing along at choral concerts, or spend weekends with their family and friends; that is, you don't need a theory of personality to explain why people do what you would expect them to do, because in some situations, most of us do the same thing as we act in accordance with the social norms called for in that situation. But, when people behave in odd and unexpected ways, a personality theory comes in very handy. A good theory can help you understand interesting and unusual people, such as Mary Calkins, or those whom you read about in the newspaper—perhaps a serial killer, a politician embroiled in sex scandal, or the antics of a favorite movie star who is in and out of drug rehab seemingly every other week.

In early 2011, a 22-year-old man, Jared Loughner, shocked the nation by gunning down 19 citizens assembled in a public space in Tucson, Arizona, to meet and greet their Congresswoman, Gabrielle Giffords (Lacey & Herszenhorn, 2011). The Congresswoman survived a bullet shot into her head, but six others died. The disaster would have been even worse had the shooter been able to reload his automatic weapon and fire off another round of 31 bullets. Fortunately, he was prevented from doing so by the heroic actions of three people: a young man assisted by an elderly man and woman. What was wrong with the killer, and what was right with those heroes? The general public, as well as psychologists, wants to know the answers to those questions.

More recently, in June 2015, a similar but even more horrific shooting killed nine African-Americans during church services in Charleston, South Carolina. Dylann Roof, a slightly built 21-year-old, only 5 foot 9 inches and 120 pounds, was the "lone wolf" murderer acting out of his hatred of Blacks and beliefs in White supremacy. Individuals or pairs acting in concert, in comparison to earlier organized racial assaults, have carried out the majority

**Figure 10.3** Types of Hate Crimes in America (FBI Statistics, 2013)

Summary of hate crimes in the U.S. by various categories



of such planned racial attacks in the past decade. Here is where prejudice combined with hate, social isolation, and access to deadly weapons creates mass tragedies. In the United States, from 2012 to 2015 there were 67 mass killings with 313 dead. So when trying to understand why these young men engaged in such violent attacks on innocent people, we have to consider both their personal factors as well as the cultural-environmental milieu in which they live (Figure 10.3).

Going from such publicly unknown people engaging in unusual behavior to a well-known person also engaging in behavior unusual for him, we have the case of golfing legend Tiger Woods. This seemingly happily married family man was publicly exposed as having engaged repeatedly in sexual escapades with many different "escorts." The scandal destroyed his marriage, seriously damaged his career, and cost him tens of millions of dollars in lost income from his sponsors. His golfing dominance was never the same in the following years.

## So How Do We Solve the Personality Puzzles of People Who Behave in Usual Ways?

Each personality theory offers a different viewpoint, so we usually need to combine several perspectives to get the whole-person picture. As a preview of coming attractions, suppose you are a counseling psychologist at a college counseling center. A client, a young woman, tells you she is contemplating suicide. How can personality psychology help you understand her (see Figure 10.4)?

From a purely descriptive point of view, you might assess her **disposition**. Is she conscientious? Is she outgoing or shy? Anxious? To find out, you might give her a personality test. Her profile of traits and temperament may suggest some form of psychological treatment or, perhaps, a more direct drug therapy.

If you decide on a psychological therapy, rather than encourage medication, you will work with her **personality processes** and, perhaps, the social forces in her environment and culture. This is the territory originally staked out by Sigmund Freud and, more recently, by cognitive–behavioral psychologists.

A **psychodynamic theory** would direct your focus toward her motives and emotions, some of which may be unconscious.

- Is she a hostile person who has turned her hostility inward?
- Does she have some unfinished emotional business from an earlier developmental stage, such as guilt for angry feelings toward her parents?
- What is the nature of her social relationships?

In contrast, a **humanistic theory** would explore her potentialities rather than her deficiencies.

- What are her talents?
- Her hopes and desires?
- And what obstacles stand between her and her goals?

A humanistic theory would also explore her unmet needs. Do her suicidal thoughts result from conscious feelings that she is alone, unloved, or not sufficiently respected?

An **existential theory** would aim to examine the young woman's sense of meaning in her life. If she is contemplating suicide, she may believe that nothing she is doing has any

**Figure 10.4** Perspectives on Personality



value or ultimate worth, so you would explore the reasons for that and strive to refocus her quest toward new values and meaningful goals.

A **social-cognitive theory**, with its emphasis on perception and learning, might suggest that her difficulty lies in the way she interprets events.

- Does she always assume her best efforts aren't good enough?
- Does she believe she controls events in her life, or do events control her?

A cognitive approach might also alert you to the possibility that her suicidal thoughts reflect a suicidal role model—a friend, family member, or, as in "copycat suicides," some celebrity who recently committed suicide.

All these approaches will be explored in detail later in the chapter. For now, here is the take-away message: No single theory has a complete answer to the question of why people do what they do. The trait and temperament theories provide a descriptive snapshot of a person's characteristics, while the "process" theories (psychodynamic, humanistic, existential, or social-cognitive theories) analyze the forces underlying those characteristics. And in most cases—whether they be heroes, villains, Mary Calkins, or the suicidal young woman we described—some combination of both is in order.

## Key Question: What Persistent Patterns, or *Dispositions*, Make Up Our Personalities?

**Core Concept 10.2**

The *dispositional* theories all suggest a small set of personality characteristics, known as temperaments, traits, or types, that provide consistency to the individual's personality over time.

Two thousand years before academic psychology appeared, people were classifying each other according to four *temperaments*, based on a theory proposed by the Greek physician Hippocrates *(Hip-POCK-rah-tees)*. A person's temperament, he suggested, resulted from the balance of the four **humors**, or fluids, secreted by the body. A *sanguine*, or cheerful, person was characterized by strong, warm blood. A *choleric* temperament, marked by anger, came from yellow bile (called *choler*), believed to flow from the liver. Hippocrates thought that the spleen produced black bile, from which arose a *melancholic,* or depressed, temperament. Finally, if the body's dominant fluid is phlegm, or mucus, the person will

have a *phlegmatic* temperament: cool, aloof, sluggish, and unemotional. Hippocrates' biology may have been a little off the mark, but his notion of temperaments established itself as "common sense." Even today, you will occasionally encounter his terms used to describe people's personalities.



Hippocrates was an early contributor to the idea of a mind–body connection. One of his beliefs was that our individual temperament is driven by our predominant body fluid, or humor, and so it could be any one of these four: sanguine, choleric, melancholic, or phlegmatic.

In modern times, other personality classification systems have appeared. The most simplistic ones are just stereotypes: if fat, then jolly; if an engineer, then conservative; if female, then sympathetic. Obviously, these beliefs oversimplify the very complicated problem of understanding the patterns found in personality. Even you may be guilty of such oversimplifications if you think of people strictly according to categories and stereotypes: college major, gender, ethnicity, sexual orientation, age, and qualities such as honesty, friendliness, or sense of humor.

Still, our human cognitive tendency to simplify complexity encourages us to group people into categories. So, some personality theorists have sought to describe people in terms of just a few basic *temperaments:* global dispositions of personality, such as "outgoing" or "shy," that have a strong biological basis. Others prefer to look for combinations of *traits*, which are generally thought of as multiple dimensions of personality, such as cautious versus reckless or friendly versus unfriendly, and are usually considered to be more influenced by experience (learning) than are temperaments. Still others classify people according to personality *types*, which are categories rather

than dimensions: You either fit the pattern for a type or you do not. For example, if introversion is a *trait dimension*, then people can have degrees of introversion—more of less of it. On the other hand, if introversion is a *type*, then people are classified as either being introverted or not introverted.

While each of these approaches is a bit different, our core concept indicates they also have a common meeting ground:

> The *dispositional* theories all suggest a small set of personality characteristics, known as temperaments, traits, or types, that provide consistency to the individual's personality over time.

Because the terms *temperament*, *trait*, and *type* overlap, we will follow the custom of placing them all under the generic heading of **dispositional theories**. But what makes such theories different from mere stereotypes—the conservative engineer, the macho male, or the tree-hugging professor? It's all in the science. A good temperament, trait, or type theory must have a solid scientific base. In that light, let's evaluate each of these approaches to personality, beginning with temperament.

By the end of this section, you will be able to:

**10.5**   **Explain the contributions of biology and learning to a person's temperament.**

**10.6**   **Review the way personality may be studied as a composition of traits**

**10.7**   **Describe the three time zones that influence our decisions and the resultant personality**

# 10.5: Personality and Temperament

**Objective:**   **Explain the contributions of biology and learning to a person's temperament**

> Psychologists define *temperament* as the biologically based personality dispositions, usually apparent in early childhood, that establish the foundation of personality and the mood of an individual's approach to life (Hogan and others, 1996; Mischel, 1993).

When speaking of temperaments, psychologists are usually referring to one or two dominant and long-standing themes, such as shyness or moodiness, that characterize a person's personality, perhaps from birth. Modern psychology has, of course, abandoned the four humors theory of temperament, but it has retained its most basic concept: *Biological dispositions do affect our basic personalities.* In support of this view, psychologists

can now point to structures in the brain known to regulate fundamental aspects of personality (LeDoux, 2002). You may recall, for example, the case of **Phineas Gage**, who received an accidental "lobotomy" and thereby demonstrated the role of the frontal lobes in regulating one's basic disposition—an observation confirmed by modern neuroscience.

## 10.5.1: Temperament from Transmitters?

Biological psychologists now suspect that some individual differences in temperament arise from the balance of chemicals in the brain, which may have a genetic basis (Azar, 2002b; Sapolsky, 1992). In this sense, the theory of humors still lives, but in a different guise: Modern biological psychology has replaced the humors with neurotransmitters. So, depression—which characterizes most people with suicidal thoughts—may result from an imbalance of certain transmitters. Likewise, anxiety, anger, and euphoria may each arise from other neurochemical patterns. As developmental psychologist Jerome Kagan says, "We all have the same neurotransmitters, but each of us has a slightly different mix" (Stavish, 1994, p. 23). That, says Kagan, is what accounts for many of the temperamental differences among people.

In fact, Kagan developed a fascinating research program focusing on the inherited basis of shyness (Kagan and others, 1994, 2005). This program has clearly demonstrated that, on their very first day, newborns in the nursery already differ in the degree to which they are responsive to stimulation. About 20% of all children are highly responsive and excitable or nervous, and 10% are extremely "inhibited." While approximately twice as many (35% to 40%) remain calm in response to new stimulation, another 10% can be seen as "bold." Over their first few months of life, these initial differences manifest themselves in temperamental differences: Many of the nervous, inhibited infants become shy and introverted, while the less excitable, more bold ones become extraverted. Although these tendencies change in some children, for most they persist over time, with the majority of children being classified with the same temperament in measurements taken over an 11-year interval. Kagan describes such effects as being due to "push of nature" in different directions.

**WATCH** Zimbardo and Kagan Talk About Temperament

Temperament expert Jerome Kagan describes differences between newborns who are bold versus timid. Watch this video where author, Phil Zimbardo talks with Jerome Kagan about temperament: https://www.youtube.com/watch?v=URee25502aU

## 10.5.2: Tempered With a Bit of Learning?

On the other hand, 40% or more of college-age students are shy—a percentage much higher than the initially inhibited shy babies (Zimbardo, 1990). It is thus reasonable to assume that while some shyness is inherited, even more is learned through negative experiences in one's social life. And initial temperament influences one's experiences: For example, if a child is withdrawn, startles easily, is unlikely to smile, and is fearful of both strangers and novelty, that child is less likely to be picked up and played with as often as a smiling, cheerful baby—thus creating an environment that is not as friendly, playful, or supportive. This difference in social stimulation, then, pushes the initially inhibited child toward introverted shyness and the bold child toward being even more extraverted. In this way, heredity and environment interact, with initially inherited characteristics becoming amplified—or perhaps muted—over time, because they produce social signals telling others to either approach and play or stay away.

Does biology, then, determine your destiny? An inherited temperament may set the *range* of your responses to some life situations. However, temperament by itself does not fully determine your life experiences (Kagan & Snidman, 1998). Even among your biological relatives, your unique family position, experiences, and sense of self all combine to guarantee that your complex personality pattern is unlike that of anyone else in the known universe (Bouchard and others, 1990).



Some shyness is inherited, and some is learned through personal experience and cultural norms.

# 10.6: Personality as a Composite of Traits

**Objective:** Review the way personality may be studied as a composition of traits

If you were to describe a friend, you would probably use the language of traits: moody, cheerful, melancholy, enthusiastic, volatile, friendly, or smart. **Traits** are multiple, stable personality characteristics that are presumed to exist within the individual and guide his or her thoughts and actions under various conditions. We might think of traits as the product of hidden psychological processes—the way our motives, emotions, and cognitions are customarily expressed in behavior (Winter and others, 1998).

## 10.6.1: How Do Traits Differ from Temperament?

Think of temperament as the foundation of personality, deeply rooted in our individual biological nature. Then think of traits as a multidimensional structure built on the foundation of temperament but also influenced by experience. Traits emerge from temperaments as nurture expands on nature.

## 10.6.2: The "Big Five" Traits

Trait theorists focus primarily on the motivational and emotional components of personality, excluding other attributes such as IQ and creativity. With the statistical tool of *factor analysis* (which helps them identify relationships, or common clusters, among different items on a personality test), investigators have largely agreed on five dominant personality factors. This perspective is known as the **five-factor theory** . Personality theorists often call these factors the Big Five (Carver & Scheier, 2008; John & Srivastava, 1999).

Before we tell you what these Big Five personality traits are, and how they influence our personalities and lives, take this online test to find out your own placement on these traits. Then, read on to learn more about what your scores mean.

Now that you know your scores on the Big Five personality traits, let's describe each one, along with how you can use your results. As we do so, remember that each score falls somewhere on a continuum for the trait, so your score will indicate how much of each trait your own personality exhibits. It's also important to note that no score is necessarily "good" or "bad"—instead, it is best to use the information to help you determine your strengths and weaknesses so you can maximize your satisfaction with life. We'll go into more detail about that shortly, but for now, here are the Big Five traits:

- *Openness to experience:* People scoring higher on this trait tend to be more curious, independent, imaginative, interested in new ideas, and prefer novelty. Those lower on the trait prefer the familiar, are more resistant to new ideas, and are less curious.
- *Conscientiousness:* Individuals with high levels of conscientiousness are dependable, goal-directed, persevering, and prudent in decision-making. On the low end of the scale, scores indicate impulsiveness, lack of reliability, and preference for spontaneity.
- *Extraversion:* Those who score high on this trait tend to be sociable, outgoing, and prefer being with others. People on the lower end of the scale, also called introverts, prefer focusing their attention inward rather than outward, are more self-reflective, and may appear shy.
- *Agreeableness:* People with high scores on this scale are seen as warm, cooperative, and likeable, as they tend to easily go along with others. Individuals with lower scores on agreeableness may seem stubborn, negative, or antagonistic.
- *Neuroticism:* This trait refers to how strongly your emotions are felt and exhibited. So, those with higher scores on neuroticism may be considered anxious or emotional, whereas those with low scores are considered more emotionally stable, or even stoic or unfeeling.



Think of the acronym OCEAN, standing for Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism.

**INTERPRETING TRAIT SCORES** As you ponder this five-factor approach to personality, remember that scores aren't meant to be good or bad—they are simply information you can use to better understand yourself and others, and to help you make life choices that best suit your traits. While U.S. culture tends to value extraversion over introversion, for example, either one can be adaptive, depending on the social and cultural situation. Thus, introversion

may be a desirable trait for a writer or long-distance truck driver, while extraversion may be preferred in a sales manager or hostess. Similarly, we value conscientiousness, openness, agreeableness, and emotional stability, but scoring on the "lower" end of each of these isn't necessarily a bad thing. For example, for a creative person, or political activist, the tendency to follow one's own beliefs and not be unduly swayed by others (lower agreeableness) is beneficial. Similarly, too much conscientiousness probably limits one's ability to take advantage of unexpected opportunities, and too much openness could lead a person to be a "Jack (or Jill) of all trades" and master of none. Rather than making judgments about what traits we "should" possess, it is better to capitalize on the traits we have and find an environment that offers the best fit with what we have going for us.

But let's not be too simplistic; you can deal with the cards you were dealt to make the most of them, but you can also try to figure out what you can do to get closer to your ideal levels of the Big Five factors. If you struggle to meet deadlines and follow through on commitments, for example, what steps can you take to be more conscientiousness? If you find yourself stuck in a rut, how can you challenge yourself to be more open to new experiences?

Overall, the five-factor theory greatly simplifies a formerly confusing picture. Although debate still continues about the details, a broad coalition of theorists has concluded that we can describe people with reasonable accuracy on just these five dimensions—quite an achievement in view of the several hundred trait terms one can find listed in the dictionary (Allport & Odbert, 1936)! "The five-factor model has fulfilled its promise to bring order to a Babel of taxonomies and instruments," according to some prominent personality theorists (Caprara & Cervone, 2000). Researchers have identified both genetic and environmental influences on the development of these individual differences in personality (Bouchard & McGue, 2003).

Significantly, the five-factor model also seems to have validity across cultures, with several large studies demonstrating the five-factor model's effectiveness in more than 50 cultures in Europe, Asia, Africa, and the Americas (McCrae and others, 2005; Schmitt and others, 2007). That broad conclusion must be tempered somewhat, though, because most of these studies sampled university students, who are more influenced by European-American worldviews, and thus did not include cultural subgroups that may not fit this model as well. Furthermore, anthropologist Rick Shweder (1991) reminds us that in some cultures, people are defined not by their personal dispositions; instead, what matters are their social roles, position within the family structure, or goals.

**BIG FIVE TRAITS: GEOGRAPHY, MORTALITY, AND FACEBOOK STYLES**   Most theories on personality development focus on the individual or interpersonal level, but could the state you live in within the United States make a difference? In a fascinating line of research, more than half a million Internet users took the Big Five inventory and then, very simply, their zip code was noted. Researchers then plotted personality test scores by state. For each personality trait, the top 10 states and bottom 10 states revealed some interesting patterns that fit with the cultural climate.

**Figure 10.5** Highlighting dominant personality styles in regions of each American state.



- Cluster 1-Friendly and Conventional reigon
- Cluster 2-Relaxed and Creative region
- Cluster 3-Temperamental & uninhibited region

For Neuroticism, the Northeast lit up (think of old Woody Allen films), while the West and Midwest were in the calm zone. Openness to Experience ranked high in the Northeast and West Coast, but lower in the Midwest. Agreeableness peaked with the hospitality of the South and was lower in the Northeast (where you might hear more honks to get moving in traffic). Conscientiousness scores were highest in the Mountain and West North Central regions (Rentfrow and others, 2008). What's more, these personality scores even correlated with which states went red and which states went blue in recent presidential elections! People voting in states that went for the Democratic

candidate scored higher on Openness to Experience and lower on Neuroticism. In contrast, people in states that supported the Republican candidate scored higher on Conscientiousness (Rentfrow and others, 2009).

Even more important was the relationship uncovered between two of the BFI factors and mortality. States with high levels of Agreeableness also had a significantly longer life expectancy, even when socio-demographic factors were controlled. Living in a state with warm, generous people may add years to your life. States highest in Neuroticism had significantly lower life expectancies and more deaths due to cancer and heart disease.

**THE PERSONALITY OF FACEBOOKERS**   Facebook, with its more than a billion users globally, is clearly one of the most popular social media networking sites. Is frequency and style of accessing Facebook linked to Big Five traits? Yes, according to a 2014 Italian study of Facebook users that revealed some interesting correlations with the Big Five traits. Respondents high in the trait of Openness tended to be early adopters of Facebook, while Conscientiousness was associated with less frequent use. Extraverts in the study spent more time in their Facebook sessions, and also had more "friends," while people high in Neuroticism were the most frequent Facebookers (Caci and others, 2014).

Now that you've learned a little about the Big Five traits, are you curious about your own placement on these five scales? If so, take this test to find out!

**ASSESSING TRAITS WITH PERSONALITY INVENTORIES**
If you were a clinical or counseling psychologist, you might want to assess a client's personality on the five factors using a paper-and-pencil instrument, such as the BFI-54 or the *NEO Personality Inventory* (or *NEO-PI*).[1] These simple but highly respected measures have been used to study personality stability across the life span and also the relationship of personality characteristics to physical health and various life events.

If, however, you want an instrument that measures clinical traits; that is, signs of mental disorder—the *Minnesota Multiphasic Personality Inventory*, usually referred to as the **MMPI-2**, is a good bet. (The "2" means it is a revised form of the original *MMPI*.) Unlike the BFI-54 and *NEO-PI*, the *MMPI-2* does not measure the Big Five personality dimensions. Rather, its 10 clinical scales (shown in Table 10.2) were developed to assess serious mental problems such as depression, schizophrenia, and paranoia (Helmes & Reddon, 1993).

Its 567 items deal with a variety of attitudes, habits, fears, preferences, physical health, beliefs, and general out-

---

[1]NEO stands for neuroticism, extraversion, and openness. Conscientiousness and agreeableness were added later, but the name, NEO Personality Inventory, was not changed.

**Table 10.2** *MMPI-2 Clinical Scales*

| Disorder | Clinical Traits |
|---|---|
| **Hypochondriasis (Hs)** | Abnormal concern with bodily functions |
| **Depression (D)** | Pessimism; hopelessness; slowing of action and thought |
| **Conversion hysteria (Hy)** | Unconscious use of mental problems to avoid conflicts or responsibility |
| **Psychopathic deviate (Pd)** | Disregard for social custom; shallow emotions; inability to profit from experience |
| **Masculinity–femininity (Mf)** | Differences between men and women |
| **Paranoia (Pa)** | Suspiciousness; delusions of grandeur or persecution |
| **Psychasthenia (Pt)** | Obsessions; compulsions; fears; low self-esteem; guilt; indecisiveness |
| **Schizophrenia (Sc)** | Bizarre, unusual thoughts or behavior; withdrawal; hallucinations; delusions |
| **Hypomania (Ma)** | Emotional excitement; flight of ideas; overactivity |
| **Social introversion (Si)** | Shyness; disinterest in others; insecurity |

look. We won't compromise the actual test items, but here are some true–false statements similar to those on the *MMPI-2:*

- I am often bothered by thoughts about sex.
- Sometimes I like to stir up some excitement.
- If people had not judged me unfairly, I would have been far more successful.

Respondents are asked to indicate whether each statement describes them, and their answers are compared against responses of people in clinical populations with known mental disorders of various kinds. Thus, the scoring is *empirically* based; that is, it is based on scientific data comparing each individual's pattern of responses with the average, or base rate responses, of a number of different clinical populations. It is not just the reasonable opinion of the test maker.

People who take personality inventories such as the *MMPI-2* often agonize over their answers to particular questions, concerned that a "wrong" answer might lead to being diagnosed as mentally disturbed. Not to worry! Personality profiles derived from *MMPI-2* responses are *never* based on a single item—or even two or three. Rather, each item merely makes a weighted contribution to one or more of the many subscales.

**COULD YOU FAKE A GOOD OR BAD SCORE ON THE MMPI-2?**   Probably not. The test has four cleverly designed "lie" scales that signal something is amiss when they pick up too many unusual responses. Here are some items similar to those on the lie scales:

- Sometimes I put off doing things I know I ought to do.
- On occasion, I have passed on some gossip.
- Once in a while, I find a dirty joke amusing.

Too many attempts to make yourself look good or bad will elevate your lie scale scores into the questionable range.

From a scientific standpoint, the *MMPI-2*, the BFI-54, and the *NEO-PI* are exemplary instruments—for two reasons.

1. First, they have excellent **reliability**. This means that they provide consistent and stable scores over time. So, when a person takes the same test on two different occasions, the scores are likely to be much the same. In fact, any usable test must have good reliability; otherwise the scores would be erratic and undependable. If the individual has not changed from test time 1 to time 2, then her or his test scores should remain relatively constant. When the scores do change significantly, then it means something has intervened during those two time periods, which is affecting the individual's mental state or functioning. This is cause for an alert.

2. Second, these tests have good **validity**, which means that they actually measure what they were designed to measure—in these cases, personality traits or signs of mental disturbance. The *MMPI-2* does a credible job, for example, of identifying individuals with depression or psychosis (Greene, 1991)—although it must be used with care in non-Western cultures because it is not clear that its validity holds when the instrument has been translated into other languages (Dana, 1993). Moreover, some observers suggest that some items may have culture-specific content (Golden & Figueroa, 2007). Clinicians should also exercise caution when giving personality inventories to members of ethnic minorities in the United States, because minority groups are not always well represented in the samples used in developing the test originally (Butcher & Williams, 1992; Graham, 1990).

## 10.6.3: Evaluating the Temperament and Trait Theories

Several criticisms have been leveled at the temperament and trait theories and the tests they have spawned. For one, these theories give us a "snapshot" of personality—a picture that portrays personality as fixed and static rather than as a dynamic process that can undergo developmental changes depending on our experience. Another criticism claims that they oversimplify our complex natures by describing personality on just a few dimensions. What would we gain, for example, by finding that Mary Calkins scored high on traits such as conscientiousness but low on agreeableness? While such judgments might validate our observations, labels leave out important details that are the deeper fabric of our personalities.

On the positive side, trait theories give us some ability to predict behavior in common situations, such as work settings—to select employees who are well suited to the job and to screen out those who might cause problems. They can also be handy in helping us predict which professors might be more open to flexible deadlines, or which of your friends you can count on. Moreover, the Big Five traits really do predict many of the things that truly matter to most of us, including health, academic success, and success in our interpersonal relationships—and with accuracy comparable to that of many diagnostic tests used in medicine (Robins, 2005).

But in the end, trait theories have one clear limitation: They *describe* behavior with a label but do not *explain* it. For example, we can attribute an easy-going person's behavior to agreeableness, or an outgoing personality to extraversion, without really understanding where the trait came from. In short, trait theories identify common traits, but they do not tell us much about their source or how traits interact (McAdams, 1992; Pervin, 1985).

Finally, with trait theory, we encounter the problem of the **self-fulfilling prophecy**. When given trait labels, people may be influenced by the expectations implied by those labels, making it difficult for them to change undesirable behavior. A child labeled "shy," for example, may have to struggle against both the label and the trait.

# 10.7:  The Personality of Time

**Objective:**  Describe the three time zones that influence our decisions and the resultant personality

Life is filled with decisions, big ones and small ones, trivial and significant ones. Study or party with friends? One more beer before driving home or give the keys to a responsible driver? Spend Saturday playing a new video game or writing that term paper? In one sense, your personality is composed of the sum of all actions you take based on how you resolve those decisions.

But what are the major influences on your decision-making process?

## 10.7.1:  How Our "Time Zone" Influences Our Decisions

We can identify three ways most people go about making such decisions. Actually, they are embedded in one of three "time zones."

1. For some, the biggest influences come from stimulation in the immediate situation: sensory (smell, taste, look, feel), biological (arousal, hunger, tiredness), and social (what others are doing, saying, modeling). Decisions based primarily on such input are focused on the present, and when they are typical of a given person, we can call him or her **present-oriented**.

2. Others faced with the same decisions look back to similar situations in the past and use those memories of what happened to decide whether to do it again or not. Again, when this focus becomes typical for most decisions, that person can be considered **past-oriented**.

3. Still others deal with that decisional matrix not by attending solely to the present or the past, because their focus is instead on the future consequences of their imagined actions. They do quick cost–benefit estimations and then act when rewards are greater than losses. We can consider such people who do so habitually to be **future-oriented**.

These subjective conceptions of time have powerful consequences on our values, judgments, decisions, and behaviors. And they do so unconsciously, outside of our awareness, because these temporal biases have been learned from childhood by many experiences such as cultural and social modeling, education, social class, religion, stability of family and nation, and homeland latitude. Thus, for example, those most likely to develop a future time orientation are more educated, from industrialized nations, from Protestant backgrounds and stable families, and do not live near the equator (where the climate never changes so people live more in the present).

## 10.7.2: Identifying Your Time Zone: The Zimbardo Time Perspective Inventory

Such ideas were transformed into a questionnaire of 56 inventory items that college students replied to using 5-point response measures to indicate how characteristic each item was for them. The five time factors that emerged formed a resulting scale that was very reliable and also had high predictive validity, known as the Zimbardo Time Perspective Inventory, or ZTPI (Boyd & Zimbardo, 2008; Zimbardo & Boyd, 1999).

The five time perspective factors and a typical scale item of each are:

1. *Future:* "Meeting tomorrow's deadlines and doing other necessary work comes before tonight's play."

2. *Present-Hedonistic:* "I believe that getting together with one's friends to party is one of life's important pleasures."

3. *Present-Fatalistic:* "It doesn't make sense to worry about the future, since there is nothing I can do about it anyway."

4. *Past-Positive:* "I prefer family rituals that are regularly repeated."

5. *Past-Negative:* "I think about the good things that I have missed out in my life."

(Note: To check out your own time perspective scores, complete the ZTPI.)

When the scores on each of these factors were correlated with responses on many standard personality tests and also with personally reported traits in a sample of more than 200 college students, the following major correlations emerged. (When you consider the robust correlations found with this new measure, recall that most results correlating any personality trait measures with other standard measures are usually in the range of 0.2 to 0.3 on a scale of 0 to 1.0.)

**Table 10.3** Correlation Table of Five Time Perspective Factors and Personality Scales

| Time Perspective | High on: | Low (negative correlation) on: |
| --- | --- | --- |
| Future | Conscientiousness (r = .7) Preference for Consistency (r = .6) | Sensation Seeking (r = −.4) |
| Present-Hedonistic | Novelty Seeking (r = .7) Sensation Seeking (r = .7) | Ego Control (r = −.75) Preference for Consistency (r = −.5) |
| Present-Fatalistic | Aggression (r = .5) Anxiety (r = .5) Depression (r = .45) | Concern for Future Consequences (r = −.7) Ego Control (r = −.4) |
| Past-Positive | Happiness (r = .4) Self-Esteem (r = .3) | Trait Anxiety (r = −.3) |
| Past-Negative | Anxiety (r = .75) Depression (r = .7) Aggression (r = .6) | Self-Esteem (r = −.6) Emotional Stability (r = −.6) |

**WHAT SHOULD ALL THIS MEAN TO YOU?** Knowing how strong the relationships between these factors are, you can apply these findings to your own habits to get a sense of what your own direction currently is. To be someone high on Present-Fatalism or Past-Negative is a sign of risk, for example, given the adverse nature of the traits and experiences related to each of these states. Obviously, success in academia and business will depend on a healthy dose of Future orientation, but not to the point of becoming a nerdy workaholic who sacrifices friends, family, fun, and sleep for success. And Present-Hedonism is essential in *moderation* to reward oneself for a task completed well, but in excess, it can become impulsive and addictive to whatever is the source of pleasure for the person, such as food, gambling, drugs, sex, or video games.

It is also important to highlight that robust relationship between being Future-Oriented and Conscientiousness. Why? Because Conscientiousness is the only personality trait directly linked to biological mortality: Conscientious people live at least 2 years longer at every age level than their less-conscientious peers and family members! This powerful finding is the conclusion from a meta-analysis of 20 independent studies with more than 9,000 individuals from six different nations (Kern & Friedman, 2008).

The relationship between Conscientiousness and Future-Orientation is not a magical one. The explanation

for why it occurs is obvious when we note that students who are high on the Future factor get regular medical and dental checkups, get cancer checks regularly, eat healthier foods, wear seat belts, drink less alcohol, smoke less, and do not engage in risky behaviors. Voila! Longer lives than those who do the opposite.

**BUT IS TIME PERSPECTIVE A PERSONALITY TRAIT?** What other information do we need, in addition to what we have presented thus far, to answer this question? How about determining whether the five time perspective factors are significantly related to each of the Big Five Factors in the NEO Personality Inventory (Costa & McCrae, 1992a)? A recent dissertation from Lithuania has done just that for us, with surprisingly supportive findings (Kairys, 2010).

This study tested more than 700 people comprising both genders in three different age groups: young (18–22); mid-aged (30–50); and older (60 and above). Thus, its findings are generalizable across age and gender in a large population from a European nation. The results? Time perspective and personality traits in the Five Factor model are highly correlated. Moreover, "it [time perspective] should belong to the domain of personality traits" (Kairys, 2010, pp. 27, 28).

What, specifically, were the relationships found between time perspective and the Big Five traits?

**Table 10.4** Relationship Between Time Perspective and Big Five Traits

| Big Five Traits | Relationship | Time Perspective (TP) |
|---|---|---|
| Conscientiousness | Positively Related | Future TP |
| Openness to Experience and Extraversion | Positively Related | Present-Hedonistic TP |
| Conscientiousness | Inversely Related | Present-Hedonistic TP |
| Neuroticism | Positively Related | Present-Fatalistic TP |
| Extraversion and Agreeableness | Strongly Related | Past-Positive TP |
| Neuroticism | Positively Related | Past-Negative TP |
| Extraversion and Conscientiousness | Negatively Related | Past-Negative TP |

It is important to note that no age differences were found in the relationships between the time perspective factors and the personality traits, although hedonism does decrease with age. Nevertheless, TP is relatively stable in the population over time. In follow-up research and analyses, Kairys and Liniauskaite (2015) report highly consistent relationships between each of the TP factors and facets of the Big Five personality traits.

Finally, some investigators are proposing that a combination of TP factors that reveal a Balanced Time Perspective are better predictors of a range of behaviors than any

current personality trait measures. Such a balance of time factors involves high past positive, moderately high future, moderate present hedonism, with low levels of present fatalism and past negative. Time perspective might be considered as a central process in human personality if additional research confirms its predictive power in linking such personal time zones to a range of behaviors (Muro and others, 2014; Usart & Romero, 2014; Zhang & Howell, 2014).

We would like you to think more deeply about how you relate to time perspective and how your behavior might be under the influence of something you carry around in your head without knowing about it. Now that you are mindful of it, make it work for you to create a more optimal time perspective that enables you to shift time zones flexibly depending on the demands of each of life's situations you face. The alternative is to be a mindless slave of time, stuck in the past, locked into future overdrive, or endlessly idling in a present mode. Our advice: Carpe diem—but after exams are aced.

## Psychology Matters

# Positivity as a Core of Personality and Well-Being

For centuries, investigators of many kinds have been searching for the keys to unlock the complexity of human personality—by identifying humors, temperaments, traits, types and profiles, as well as assessment devices of all sorts. An Italian research team from Rome believes that they have recently found the "magic bullet" to simplifying the core of personality through a concept called *Positivity*, which they argue is central to optimal functioning and well-being (Caprara & Alessandri, 2014). But what is positivity? Let's take a closer look at this intriguing new concept, which is turning out to be centrally linked to many determinants of subjective well-being and appears to have a heritable component.

**Positivity** is defined as having positive evaluations about one's self, one's life, and one's future. Among all basic personality traits, the tendency to take this positive stance regarding life experiences predisposes people to value their own lives and those of others. This is true despite the frailty of human existence, and therefore equips us to strive for self-realization through autonomy, competence, and social relatedness. This basic disposition, leading to appraisal of all life experience with a positive outlook, is necessary to grow, to flourish, to cope with life despite adversities, failures and loss, and to continue to care for living despite the decline of aging and awareness of our mortality.

A growing set of research findings that includes both twin studies and cross-cultural studies now indicates that Positivity is a core dispositional trait that includes both emotional and cognitive components (Caprara and others, 2012;

Fagnani and others, 2014). As such, it promotes a stance toward life and experience that pervasively affects individuals' relations with themselves and the outer world. Findings from immunological and brain scan studies further corroborate the hypothesis that this disposition is a basic component of our psychological endowment (Alessandri and others, 2015). Much recent research also attests to its impact in the service of optimal function across many domains; promoting supportive interpersonal relations, enhancing work performance and achievements, and moderating the undesirable consequences of severe illness (Caprara & Alessandri, 2014; Livi and others, 2015). Thus, Positivity can be framed as a metaphor of the life instinct in so far as it is a powerful force at service to enhancing the quality of our lives.

# Key Question: How Do Mental *Processes* Help Shape Our Personalities?

> **Core Concept 10.3**
>
> While each of the *process* theories emphasizes different forces in the development of personality, all portray personality as the result of both internal mental processes and social interactions.

Throughout the rest of the chapter, we will use the case study of Mary Calkins as the personal exemplar to illustrate various theories of personality. To understand the psychological forces underlying Calkins's traits, we must turn to theories that examine the mental *processes* that actively shape people's personalities. In other words, we must go beyond the simple labels for static traits, types, and temperaments we have considered previously, to try to understand *how* personality develops. Specifically, we will consider four kinds of "process" theories: the psychodynamic, the humanistic, the existential, and the cognitive theories. What do they have in common? Consider our core concept for this section:

> While each of the *process* theories emphasizes different forces in the development of personality, all portray personality as the result of both internal mental processes and social interactions.

Although the four viewpoints we will consider in this section of the chapter share some common ground, each emphasizes a different combination of factors.

1. The **psychodynamic theories** call attention to unconscious motives and the influence of past experiences, especially from early childhood, on our mental health.
2. **Humanistic theories** emphasize consciousness and our present, subjective reality: what we believe is important now, our innate tendency to grow into our best selves, and how we think of ourselves in relation to others.
3. **Existential theories** attempt to link the present to an idealized future in the ongoing quest to find meaning in one's existence, and purpose and significance in one's life.
4. **Social-cognitive theories** focus on the combined, complex set of influences of learning, perception, and social interaction on our current behavior, for better or for worse.

By the end of this section, you will be able to:

**10.8**  Compare the psychodynamic theories of personality

**10.9**  Examine the different humanistic theories of understanding personality

**10.10**  Relate the concept of hardiness to the existential approach to understanding personality

**10.11**  Evaluate the contributions of social-cognitive theories to understanding personality

**10.12**  Recall three important new trends in our thinking about personality

# 10.8:  Psychodynamic Theories: Emphasis on Motivation and Mental Disorder

**Objective:**  Compare the psychodynamic theories of personality

The psychodynamic approach originated in the late 1800s with a medical puzzle called *hysteria*, now known as *conversion disorder.* In patients with this condition, the physician observes a set of physical symptoms such as muscle weakness, loss of sensation in part of the body, or even paralysis—but with no apparent physical cause, such as nerve damage. The psychological nature of hysteria finally became apparent when the French physician Jean Charcot (pronounced *shar-COE*) demonstrated that he could make hysterical symptoms disappear by suggestion while his patients were in a hypnotic trance.

## 10.8.1:  Freud and Psychoanalysis

Hearing of Charcot's work, the young and curious doctor Sigmund Freud (1856–1939) traveled to Paris to observe up close Charcot's renowned hypnotic demonstrations. Inspired

by what he saw, Freud returned to Vienna, resolving to try the hypnotic cure on his own patients. But to his dismay, Dr. Freud found that he could not hypnotize many of them deeply enough to duplicate Charcot's results. He did not know that people vary widely in their degree of *hypnotizability*, the ability to follow suggestions offered by a hypnotic agent. Moreover, even the ones who lost their symptoms under hypnosis usually regained them after the trance was lifted. Finally, a frustrated Freud resolved to find another way to understand and treat the mysterious illness. The result was the first comprehensive theory of personality—and still a standard by which all others are compared.

The new approach Freud created became known as **psychoanalysis** or **psychoanalytic theory**. Technically, psychoanalytic theory is the term for Freud's explanation of personality and mental disorder, while psychoanalysis refers to his system of treatment for mental disorder. In practice, however, it has always been difficult to separate Freud's theory from his therapeutic procedures. Thus, the term *psychoanalysis* is often used to refer to both (Carver & Scheier, 2008).

As you study Freud's theory, you may find some points on which you agree and others on which you disagree. We recommend bringing all your critical thinking skills to bear, but at the same time, maintaining respect for Freud and the task he faced, more than 100 years ago, as the first great explainer of all of human personality. His is really the grandest theory of personality, human development, and mental illness.

**THE FREUDIAN UNCONSCIOUS**   At center stage in personality, Freud placed the **unconscious**, which he viewed as the mind's hidden, seething cauldron of powerful impulses, instincts, motives, and conflicts that energize the personality. We normally have no awareness of this hidden psychic territory, said Freud, because its contents are so threatening and anxiety-provoking that the conscious mind refuses to acknowledge its existence, even in the healthiest of us. Only by using the special techniques of psychoanalysis can a therapist find, for example, that an adult who had experienced a traumatic event in childhood still retains these aversive memories in the unconscious. That event might have been of a sexual or violent nature, being lost, or being in a fatal accident or natural disaster. We glimpse such memories when they attempt to escape from the unconscious, disguised perhaps as a dream or a slip of the tongue or as a symptom of mental disorder, such as depression or a phobia. So, mentally healthy or not, Freud maintained that we all go about our daily business without knowing the real hidden motives behind some of our behaviors.

**UNCONSCIOUS DRIVES AND INSTINCTS**   Freud taught that the turbulent processes in the unconscious

mind are fueled by psychological energy from our most basic and secret motives, drives, and desires—the mental equivalent of steam in a boiler. Psychoanalytic theory, then, explains how this unconscious mental "steam" is transformed and expressed in disguised form in our conscious thoughts and behavior. The unconscious sex drive, for example—which Freud named *Eros* after the Greek god of passionate love—could be expressed either directly through sexual activity or indirectly through such releases as joking, work, or creative pursuits. (Perhaps you never thought of activities like dancing, drawing, cooking, studying, or body building as sexual acts—but Freud did!) The energy produced by Eros he termed **libido**, from the Latin word for "lust." Libidinal energy, in turn, fuels or energizes the rest of the personality as a primitive life force.

But Eros and its libidinal energy did not explain everything that fascinated Freud. Specifically, it did not explain acts of human aggression and destruction. Nor did it explain the symptoms of war veterans who continued to relive their wartime traumas in nightmares and hallucinations. Such misery could only be accounted for by another drive, which he named *Thanatos* (from the Greek word for "death"). Freud conceived of Thanatos as the unconscious "death instinct" that drives the aggressive and destructive acts that humans commit against each other and even against themselves. (Think of smoking, compulsive gambling, reckless driving, or drug abuse.)

**THE STRUCTURE OF NORMAL PERSONALITY**   Freud pictured the personality as a trinity composed of forces he called the ego, the id, and the superego, which together form a mind continually at war within itself. He believed that the sexual and aggressive forces of the id wage a continuing battle against the moralistic forces of the superego. The ever-practical ego serves as the moderator of this conflict.

Freud conceived of the **id** as the primitive, unconscious reservoir containing our basic motives, drives, and instinctive desires—including Eros and Thanatos—that energize all three parts of our personality. Like a child, the id always acts on impulse and pushes for immediate gratification—especially sexual, physical, and emotional pleasures—to be experienced here and now without concern for consequences.

By contrast, the **superego** serves as the mind's parental avatars—virtual "parents" living in the mind—in charge of values and morals absorbed from parents, teachers, other authority figures, and society. The superego corresponds roughly to our common notion of "conscience." It develops as the child forms an internal set of rules based on the external rules imposed by parents and other adults. And it is the inner voice of "shoulds" and "should nots." The superego also includes the *ego ideal*, an individual's view of the kind of person he or she should strive to become. Understandably, the superego frequently opposes

id's desires, because the id wants to do only what feels good, while the superego insists on doing only what is right and moral. The superego becomes our conscience, our moral compass, so that when we follow it our self-regard is enhanced, and our society works more honestly.

It falls to the rational and logic-driven **ego** to play the role of referee in the frequent battle between id and superego. A well-functioning ego can resolve the conflict between the selfish desires of the id and the moralistic goals of the superego by offering a solution that—to some degree—can satisfy both. Former President Jimmy Carter, for example—widely considered a model of decorum—got in trouble for his honest confession in a *Playboy* interview when he said, "I've looked on a lot of women with lust. I've committed adultery in my heart many times." In Freudian parlance, that "mental adultery" was his ego's way of partially satisfying the id, without stepping outside the boundaries of his superego and its moral compass. Your own ego probably offers similar solutions to your own inner conflicts when, say, your id wants to skip class and be outside on a sunny day but your superego worries about falling behind in school—what type of compromise might your ego come up with in that situation? In extreme instances, however, a mental disorder may be triggered when pressures escalate to the point where the ego cannot find workable compromises to major conflicts and the superego is challenged by new circumstances.

---

**Figure 10.6** Freud's Model of the Mind

In another famous metaphor, Freud likened the mind to an iceberg, because only a small portion appears "above the surface"—in consciousness. Meanwhile, the vast unconscious mind lurks "beneath the surface" of our awareness.



**PSYCHIC DETERMINISM** Psychoanalysis literally leaves nothing to accident. According to the principle of **psychic determinism**, all human behavior is determined by our inner mental states—by unconscious memories, desires, and conflicts. Chance and coincidence do not exist in the Freudian dictionary. Inevitably, the way you feel unconsciously leaks out in your behavior. You just can't help it. You are late for a class you don't like or to a meeting with a snobby person, you forget someone's birthday, or you say, "Sad to meet you, oh, I'm sorry, I meant *glad* to meet you," and so forth.

Accordingly, everything a person does potentially has a deep psychological meaning to the Freudian analyst. In therapy, mental symptoms such as fears and phobias are signs of unconscious difficulties to be uncovered and worked through. Similarly, the analyst may catch a glimpse of the unconscious at work in a so-called *Freudian slip*—when "accidental" speech or behavior belies an unconscious conflict or desire. Former President George W. Bush was famous for slips of the tongue, as when intending to describe how invigorating his childhood home of Midland, Texas, had been during his youth, he said instead, "It was just inebriating . . ."—which, of course, came across as a Freudian slip because Bush had been a heavy drinker at that time in his life. And Democrats do it, too: Ted Kennedy once called for the "breasts" in a speech when he meant to say "best (and brightest)"— a blunder made even more noticeable when his hands simultaneously cupped the air! (We hasten to add, in defense of anyone who has committed a speech blunder, that cognitive psychologists today believe that most slips of the tongue are mix-ups in the brain mechanisms we use to produce language, and thus may have no relationship to unconscious intentions. On the other hand, however, some research has demonstrated that we sometimes blurt out the very thoughts we are trying to contain in high-anxiety situations.)

**THE INFLUENCE OF EARLY EXPERIENCE ON PERSONALITY DEVELOPMENT** As Freud talked with his patients about their pasts, he began to understand that personality follows a developmental pattern through childhood and into adulthood. He proposed that emerging sexual and aggressive drives propel the child through a series of **psychosexual stages**. In each stage, stimulation of specific body regions is associated with erotic pleasure.

1. In the *oral stage*, pleasure is associated with the mouth: suckling, crying, spewing.

2. In the *anal stage*, pleasure comes from stimulating parts of the body associated with elimination. (This explains the pleasure young children get from sharing dirty words, like "shit.")

3. Next, in the *phallic stage*, pleasure comes from "immature" sexual expression, such as masturbation.

4. Finally, after a quiet period of latency, the adult *genital stage* brings maturity and mental well-being to those fortunate enough to resolve the conflicts of earlier stages.

During the phallic stage, said Freud, a child must resolve feelings of conflict and anxiety by identifying more closely with the same-sex parent.

**Why such a seemingly bizarre theory of child development?** Among the issues that Freud was trying to resolve with his theory of psychosexual development were those of gender identity and gender roles. Why, he wondered, do boys usually develop a masculine identity, even though most boys are raised primarily by their mothers? Why do boys and girls, as they become adults, most often develop a sexual attraction to the opposite sex? And why do some *not* follow this pattern?

**PATTERNS OF PSYCHOSEXUAL DEVELOPMENT** Freud's answers to these questions were convoluted and, many psychologists would say, contrived to fit his personal views. His psychodynamic perspective ignored the external influence of the different ways that boys and girls are socialized; it also ignored the possibility of differences in genetic programming, of which almost nothing was known in Freud's day. For boys, his solution was the **Oedipus complex**, an unconscious conflict that initially drives young males to feel an immature erotic attraction toward their mothers. (You may have heard a little boy say that he wants to marry his mother when he grows up.) As the boy goes through the stages of psychosexual development, resolution of the Oedipal conflict requires him to *displace* (shift) his emerging sexual desires away from his mother, directing them instead to females of his own age. At the same time, he develops an **identification** with his father. In a parallel fashion, Freud theorized that girls develop an attraction to their fathers and so become competitive with their mothers for his affection. This unconscious conflict among girls is known as the **Electra complex**, named after another important Greek figure.

Most psychologists today reject these Freudian assumptions about psychosexual development because they lack scientific support. It is important, however, to remember three things: First, we still don't fully understand how sexual attraction works. Also, recent national changes in openness regarding alternative gender identities and transgender life styles should encourage more new research on this vital aspect of our sexual nature. Second, Freudian concepts about psychosexual development—strange as they may seem—continue to have a wide impact outside psychology, particularly in literature, and notably so in current psychology in France. And finally, while Freud may have been wrong about the details of psychosexual development, he may have been right about the idea that children all progress through *stages of development* (Bower, 1998b) that is a central focus among many developmental psychologists.

**EGO DEFENSES** In managing the conflict between the id's impulses and the superego's morality, Freud suggested that the ego often relies upon a suite of **ego defense mechanisms**. All operate, he said, at the *preconscious level*—just beneath the surface of consciousness—to reduce the anxiety prompted by the internal conflict. Under mild pressure from the id, then, we may utilize simple ego defenses, such as *fantasy* (as we saw in the example of President Carter) or *rationalization*. But if unconscious desires become too insistent, the ego may reduce the ensuing anxiety by "putting a lid on the id"; that is, by sequestering extreme desires or threatening memories deep in the unconscious mind. Freud called this **repression**, and asserted it as the most central of all ego defenses because it underlies many of the other mechanisms that disguise our true feelings through distorted behavior and perceptions. It can lead to dysfunctional sexual relationships, as well as failures to relate openly to others when they are symbolically similar to some repressed ideal or feared person.

Repression can block access to feelings as well as memories. So, a child might repress strong feelings of anger toward her father—which, if acted on, might incur severe punishment. Likewise, boys repress the erotic Oedipal feelings they have for their mothers. Once repressed, a feeling or a desire can no longer operate consciously. But, said Freud, it is not gone. At an unconscious level, repressed feelings, desires, and memories continue to influence behavior, but in less direct ways, perhaps disguised, as we have seen, in dreams, fantasies, or symptoms of mental disorder.

Always the keen observer of human behavior, Freud proposed many other ego defense mechanisms besides fantasy, rationalization, and repression. Here are some of the most important:

- **Denial**: "I don't have a problem." This defense avoids a difficult situation by simply denying that it exists. Denial is frequently seen, for example, in people with drinking problems, people who have problems managing anger, and people who engage in risky behavior such as unprotected sex.
- **Rationalization**: A student who feels stressed by academic pressures may decide to cheat on a test, rationalizing it by saying that "I've never cheated before, and I was too sick to study this time." People using this defense mechanism give socially acceptable reasons for actions they take that they really believe to be unacceptable.

- **Reaction formation**: We see reaction formation in people who act exactly in opposition to their unconscious desires, such as a person who is troubled by their attraction to the same sex and so loudly speaks out against same-sex marriage, or perhaps goes to great lengths to prove their attraction to the opposite sex by dating many people (of the opposite sex) at the same time. Doing so helps keep the anxiety at bay, through the constant attempts to prove to oneself that the desire doesn't exist. And reaction formation isn't just about sex. A person who really hates his boss might act extremely nice to her instead, essentially resolving the conflict between the id (who probably wants to do harm to the boss) and the superego (which says hurting others is wrong, and the boss is also the source of the paycheck) by trying to show himself how much he really does like her. It is important to note that this defense mechanism is very difficult to recognize in oneself.

- **Displacement**: When your boss makes you angry, you may later displace your anger by yelling at your significant other or throwing something at the wall. Road rage is another common example of displacement. More generally, displacement involves shifting your reaction from the real source of your distress to a safer individual or object.

- **Regression**: Under stress, some people hide; others cry, throw temper tantrums, or even wet their pants. In so doing, they regress to an earlier developmental stage by adopting immature, juvenile behaviors that were effective ways of dealing with stress when they were younger.

- **Sublimation**: When sexual energies or other unacceptable impulses are bottled up, the person may seek more acceptable outlets by engaging in intense creative actions, sports, or excessive work activities. So, for example, if you feel sexually frustrated or angry, you might go to the gym for a workout, write in your journal, or clean your house—thus channeling your energies into an essentially positive direction. Freud conjectured that sublimation was responsible for some of civilization's major advances.

- **Projection**: When certain personal attitudes or values cannot be fully accepted or owned up to, they can be directed outward and seen instead as characteristics of others. Thus, a person in a committed relationship who is feeling attracted to someone else accuses his or her partner of cheating. Someone who cannot accept harboring prejudiced views toward some out-group comes to see others as prejudiced, sexist, or racist, for example. More generally, people may use the defense of projection to misattribute their own unconscious desires and fears onto other people or objects.

This last concept—projection—led to the development of projective tests, which have found extensive use in clinical psychology for evaluating personality and mental disorders. Let's take a brief detour at this point to introduce you to these projective techniques that are used by clinical psychologists to uncover hidden aspects of human nature.

## PROJECTIVE TESTS: DIAGNOSIS VIA A DEFENSE MECHANISM

**Figure 10.7** An Inkblot Similar to Those Used in the Rorschach Test



What do you see in Figure 10.7? The head of an insect? An MRI scan of the brain? Something else? Ambiguous images such as these are the basis for **projective tests** that psychodynamic clinicians employ to probe their patients' innermost feelings, motives, conflicts, and desires. The assumption is that troubled people will *project* their hidden motives and conflicts onto such images, much as people gazing at the clouds may see objects in them that illustrate their fantasies.

In the most famous of projective techniques, the **Rorschach Inkblot Technique** (pronounced *ROAR-shock*), the stimuli are merely symmetrical inkblots (like the one you saw in Figure 10.7). The technique calls for showing the images one at a time and asking the respondent, "What do you see? What does this seem to be?" The examiner usually interprets responses psychoanalytically, looking for patterns in the set of responses, and then noting unconscious sexual and aggressive impulses or repressed conflicts they may reflect (Erdberg, 1990).

**How well does the *Rorschach* work?** Objective studies have been disappointing in the lack of consistency and accuracy in measuring individual differences in personality (Lilienfeld and others, 2010). Critics also claim that the test is based on concepts (such as unconscious motivation) that are impossible to demonstrate objectively. Despite these criticisms, however, many clinicians have continued to champion

the *Rorschach*, arguing that it can provide unique insights as part of a broader personality assessment (Hibbard, 2003).

By comparison, the **Thematic Apperception Test (TAT)**, developed by Harvard psychologist Henry Murray, is a projective test that stands on somewhat firmer scientific ground, especially for assessing achievement motivation. The test consists of ambiguous pictures, like the ones in Figure 10.8,

**Figure 10.8** The TAT Projective Test

Take a few moments to look at these three images, and create a short description in your mind of what is going on in each one.



for which respondents are instructed to generate a story, telling what the characters in the scenes are doing and thinking (present focus), what led up to each event (past focus), and how each situation might end (future focus).

According to the projection hypothesis underlying the *TAT*, the respondent first perceives the elements in the picture and then *apperceives* (fills in) personal interpretations and explanations based on his or her own thoughts, feelings, memories, and needs. The examiner then interprets the responses by looking for psychological themes, such as aggression, sexual needs, achievement motives, and relationships among people mentioned in the stories.

---

**WRITING PROMPT**

**TAT**

Respond to the inkblot image in two ways: First, imagine you just got some great news, like you won a prize that delighted you. Then create a second set of reactions to the same image by imagining you have just been rejected by a close friend, or failed an important exam.

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

---

## 10.8.2: Evaluating Freud's Work

Whatever your reaction to Freud, you must give him credit for developing the first and still, perhaps, the most comprehensive theory of personality, mental disorder, and psychotherapy. He did so at a time when we had no understanding of genetics and neurotransmitters, no particularly effective treatments for most mental disorders, and no understanding of the influences on gender identity or sexual development. His writing was so incisive and his arguments so compelling that he has had a greater impact than any other theorist on the way we think about personality and mental abnormality. He gave us the **unconscious**, the concept of developmental stages, the notion of **defense mechanisms**, and the idea that behavior—and even our dreams—may have hidden meanings. Moreover, he made human sexuality a central theme in personal development and disordered functioning during the Victorian era when any mention of sex was taboo. Even among psychologists, many of whom had largely rejected his ideas in the past, Freud is enjoying renewed support as one of the keenest observers of human behavior who has ever lived (Solms, 2004). Again and again he saw in little things big antecedents or consequences. Freud was to Sherlock Holmes as a mind detective is to a homicide detective. Nearly everyone would agree that people *do* displace aggression, rationalize

their behavior, and see their own shortcomings more easily in others than in themselves.

**FREUD AS UNSCIENTIFIC** Nevertheless, Freud still plays to mixed reviews (Azar, 1997; McCullough, 2001). The biggest problem is that many of his concepts, such as "libido," "anal stage," or "repression," are vague, lacking clear **operational definitions**. One of the most widely known illustrations of this problem lies in the controversy over "recovery" of repressed memories of childhood sexual abuse. Without credible, independently verifiable evidence (which often doesn't exist), how could one ever determine whether a recovered memory had been truly repressed or was merely implanted by suggestion of a well-meaning therapist or social worker, or from reading media accounts? Such difficulties make psychoanalytic theory difficult to evaluate scientifically.[2]

Although Freud never bothered to build a careful scientific case for his observations, critics may have judged him too harshly on this count, argues Drew Westen (1998), one of Freud's staunch defenders. Researchers have validated many of his most fundamental insights, says Westen. Among these well-established notions:

- Much of mental life *is* unconscious (although the unconscious may not operate exactly as Freud envisioned);
- People *can* have conflicts arising from conflicting motives (some conscious and some unconscious) that push them in different directions simultaneously;
- Stable personality patterns *do* begin to form in childhood—sometimes for better, sometimes for worse—in part as the result of childhood experiences.

Moreover, a review of Freud's influence on his 150th anniversary suggests it is enjoying a rebirth, curiously from neuroscientists!

"They are finding that biological descriptions of the brain may fit together best when integrated by psychological theories that Freud sketched century ago" (Solms, 2006, p. 29).

Some of those scientists are using modern neural "imaging technologies to investigate some of Freud's most basic tenets; that dreams represent unfulfilled wishes, that the three parts of the Freudian psyche have neuronal bases, and also that Freud's talk therapy actually changes the physical network of neurons in the brain" (Ayan, 2006, p. 36).

[2]Because many of Freud's ideas are not testable, his psychoanalytic theory is not truly a scientific theory. Here, we follow common usage, which nevertheless calls it a theory because it is such a comprehensive explanation for personality and mental disorder. It should be noted, however, that valiant efforts are being made to put Freud's concepts on a scientific footing (Cramer, 2000).

**RETROSPECTIVE BUT NOT PROSPECTIVE** A second criticism says that Freudian theory is a seductive explanation for the past but a poor predictor of future responses; that is, it may be merely a clever example of **hindsight bias**. And by overemphasizing the origins of behavior in childhood, psychoanalysis may compound the problem by directing attention away from the current stressors in one's present life that may be the real causes of mental and behavioral disorders.

**GENDER ISSUES** A third criticism faults Freud for giving short shrift to women. Particularly aggravating is his portrayal of women as inevitably suffering from "penis envy." (He thought that women spent their lives unconsciously trying to make up for their biological deficit in this department.) A better explanation is that Freud's theory simply projects onto women his own attitudes and those of the male-centered world of his much earlier time. How would he explain the fact that women in our current era are excelling across almost all academic areas compared to men's lesser performance?

**NEWER VIEWS OF THE UNCONSCIOUS** A final criticism claims that the unconscious mind is not as unruly as Freud believed (Loftus & Klinger, 1992). In this newer view, coming out of neuroscience research in emotion, the brain has parallel conscious and unconscious processing pathways, with the unconscious quick to detect emotion-provoking stimuli (think of your "gut" reaction to a shadowy figure approaching you on a dark street), while consciousness acts more deliberately and logically ("OK," you say to yourself. "Remain calm and act naturally, and maybe he won't sense that you are scared.") This new view of an unconscious emotional processing system is much less malign and turbulent than the unconscious filled with raging sexual desires and destructive death wishes that Freud had imagined (LeDoux, 1996).

**FREUD'S APPEAL BEYOND PSYCHOLOGY** Despite these objections, Freud's ideas have found a receptive audience with the public at large (Adler, 2006). Much of his appeal may be explained by his graceful writing and by his emphasis on sexuality, a topic that grabs everyone's interest—as Freud well knew! As a result, Freudian images and symbols abound in the art and literature of the 20th century. His ideas have had an enormous influence on marketing as well. For example, advertisers make billions by associating products with sexy models, hinting that the products will bring sexual satisfaction to their owners. They also capitalize on Freud's destructive instinct by reminding us of threats to our happiness (social rejection, irregularity, untimely death) and then offering products and services to reduce our anxiety and restore hope.

Sex sells cars and virtually everything in our culture by association of objects with sexy models.

It is not by chance that such advertising themes play on Freudian concepts. Freud's nephew, Edward Bernays, considered to be the pioneer of modern public relations, initially developed them as social propaganda using a variety of techniques to get and direct public attention.

"If we understand the mechanism and motives of the group mind," he wrote, "is it not possible to control and regiment the masses according to our will without their knowing about it? The recent practice of propaganda [in WW I] has proved that it is possible, at least up to a certain point and within certain limits" (*Bernays*, 1928 ed., p. 71). This scientific technique of opinion-molding Bernays termed the "engineering of consent."

In 1923, he wrote what became the bible of PR, *Crystallizing Public Opinion.*

**HOW WOULD FREUD HAVE SEEN MARY CALKINS?**  Let us end our discussion of Freud by seeing whether his explanation of personality can give us a useful perspective on Mary Calkins. A psychoanalyst interpreting her sense of purpose and willingness to fight the system would look first to her childhood for experiences that may have shaped her personality.

The Calkins family was especially close (Furumoto, 1979). Mary's mother, Charlotte Calkins, suffered from deteriorating health, so Mary, as the eldest child, took over many of the duties of running the household—an especially interesting development in view of Freud's suggestion that girls compete with their mothers for their fathers' attention. For his part, Mary's father, the Reverend Wolcott Calkins, was a Congregationalist minister who placed a high value on education and personally tutored Mary at a time when education for women was not fashionable. Any sexual feelings she may have felt from this close association with her father would then get sublimated into Mary's intense work habits for the rest of her life.

Another decisive event, which caused Mary great distress, was the death of her younger sister. From a Freudian viewpoint, her sister's death may have produced a conflict based on unconscious feelings of *sibling rivalry* for the parents' affections—her **id** might be gratified at the loss of competition, while her **superego** felt grief at the loss. A Freudian analyst might also suggest that, in her work, Calkins sublimated her anger at the necessity of taking on mother's role as a child and at the sexist prejudices she endured in her career. As is usual with psychoanalysis, of course, these guesses are guided by hindsight—and can be neither proved nor disproved.

## 10.8.3:  The Neo-Freudians

Freud was always a controversial and charismatic figure—a dramatic image he liked to promote (Sulloway, 1992). Although he attracted many followers, Freud tolerated no criticism from any of them concerning the basic principles of psychoanalysis. So, like rebellious children, several of Freud's equally strong-willed disciples broke away to establish their own systems of personality, mental disorder, and treatment. While these **neo-Freudians** (literally, "new Freudians") departed from Freud's theory in some ways, they always retained his emphasis on **psychodynamic theory**; that is, they kept Freud's idea of personality as an emerging process driven by unconscious energy—even as they disagreed about the specific unconscious motives that energize personality. And you may also take a stand on each of these contentious issues:

- Are our motives primarily sexual or social?
- Are they more conscious or unconscious?
- Is personality determined by events in the past or by our goals for the future?

Let's examine some of the divergent paths followed by these neo-Freudians.

**CARL JUNG: EXTENDING THE UNCONSCIOUS**  Freud attracted many disciples, but none was more famous than Carl Jung (pronounced *YOONG*), a member of the inner circle of colleagues who helped Freud develop and refine psychoanalytic theory during the first decade of the 1900s. For a time, Freud viewed the somewhat younger Jung as his "crown prince" and probable successor. But Freud's paternal attitude increasingly vexed Jung, who was developing radical theories of his own (Carver & Scheier, 2008). Eventually this personality conflict—which Freud interpreted as Jung's unconscious wish to usurp his fatherly authority—caused a split in their relationship.

For Jung, the break with Freud centered on two issues. First, Jung thought his mentor had overemphasized sexuality at the expense of other unconscious needs and desires which Jung saw at the heart of personality. In particular, he believed **spirituality** to be a fundamental human motive, coequal with sexuality. Moreover, he disputed the very structure of the unconscious mind. Jung's new and expanded vision of the unconscious is Jung's most famous innovation.

**THE COLLECTIVE UNCONSCIOUS** In place of the Freudian **id**, Jung installed a two-part unconscious, consisting of both a **personal unconscious** and a **collective unconscious**. While the Jungian personal unconscious spanned essentially the same territory as the Freudian id, its collective twin was another matter—and wholly a Jungian creation. He saw in the collective unconscious a reservoir for instinctive "memories" shared by people everywhere—in much the same way that humans share a common genetic code. These collective memories tie together countless generations of human history and give us the ancient images, called **archetypes**, that appear and reappear in art, literature, and folk tales around the world (Jung, 1936/1959).



Jungian archetypes abound in art, literature, and film. This photo embodies the archetype of magician or trickster. The same archetype is evoked by the coyote in Native American legends and by Merlin in the King Arthur legends.

For Jung, the causes of mental disorder include not only repressed traumas and conflicts in the personal unconscious, but also failure to acknowledge the archetypes we find unacceptable in our collective unconscious.

Among these archetypal memories, Jung identified the *animus* and the *anima*, which represent the masculine and feminine sides of our personalities. Other archetypes give us the universal concepts of *mother*, *father*, *birth*, *death*, the *hero*, the *trickster*, *God*, and the *self*. On the darker side of the self lurks the *shadow* archetype, representing the destructive and aggressive tendencies (similar to Freud's Thanatos) that we don't want to acknowledge in our personalities. You can recognize your own shadow archetype at work the next time you feel angry, hostile, envious, or jealous.

**THE IMPORTANCE OF BALANCE** Jung's *principle of opposites* portrays each personality as a balance between opposing pairs of tendencies, such as the masculine and feminine side of our personalities. The most famous of the pairs he proposed is that of **extraversion** and **introversion**. Extraverts turn attention outward, toward people and things in the world around them, while introverts focus on the inner experience of their own thoughts and feelings. As a result, extraverts are more in tune with people and external events than they are with their own inner needs. They tend to be outgoing and unaffected by self-consciousness. Introverts, by contrast, focus on inner experience—their own thoughts and feelings—which makes them seem more shy and less sociable. As a result of their inner focus, though, they are more aware of their own thoughts and feelings than are extraverts. The healthy personality, according to Jung, maintains a balance among these opposing pairs—although Jung also noted that few people have all pairs of forces in perfect balance. Instead, one or another dominates, giving rise to the notion of personality types, or patterns, that are fundamental and enduring aspects of an individual's personality (Fadiman & Frager, 2001).

**EVALUATING JUNG'S WORK** Like Freud, Jung's influence is now more evident outside of psychology, particularly in literature and the popular press. In three respects, however, Jung has had a big impact on psychological thinking.

1. First, he challenged Freud and thereby opened the door to a spate of alternative personality theories.
2. Second, his notion of *personality types*, and especially the concepts of introversion and extraversion, makes Jung not only a psychodynamic theorist but a pillar of the temperament/trait/type approach.
3. Third, his focus on spirituality now resonates with many more people than in previous years, notably with pastoral (religious) counselors.

**WATCH** Carl Jung Describes the Unconscious



Jung's view of the nature of the unconscious mind.

**Could Jung's theory give us a new perspective on Mary Calkins? What do you think?**

Jung might have suspected that Calkins's determination to succeed in the male-dominated world of her day was energized by conflicts between the masculine and feminine sides of her nature, the animus and anima. Another Jungian possibility is that her mother's ill health, which caused her to relinquish much of the maternal role, made Mary deny her own maternal archetype—which may have been why she never married, and also why she was so willing to embrace the intense work schedule within a male-dominated world of academia.

**A MODERN APPLICATION OF JUNG'S THEORY: THE MBTI**   Jung's theory of types inspired the mother–daughter team of Katharine Cook Briggs and Isabel Briggs Myers to develop a tool to allow people to assess their own preferences on several pair dichotomies: the Myers-Briggs Type Indicator (MBTI® tool; Myers, 1998). Their goal was to help people gain a better understanding of themselves and others, and to then use those insights to improve their interpersonal relationships. Over many years, Myers developed a series of questions to assess a person's preferences on four pair dichotomies that, when combined, yield a pattern that indicates his or her type—of which there are 16 possibilities. None of these types are considered "better" or "worse"—they are simply different, but those differences may have important implications for how people behave.

On the basis of Jung's *principle of opposites*, the MBTI assesses people's preferences on the following four dichotomies:

**Table 10.5**  People's Preferences on Four Dichotomies from the MBTI

| Dichotomies (4) | Choices of Preference (8) | Descriptions of Preferences |
|---|---|---|
| **1. Where Do People Focus Their Attention?** | Extraversion (E) | The natural focus of Extraversion is the external world. |
| | or Introversion (I) | The natural focus of Introversion is the internal world. |
| **2. How Do People Take In Information?** | Sensing (S) | Sensing is taking in and presenting information in a sequential, step-by-step way. |
| | or Intuition (N) | Intuition is taking in and presenting information in a snapshot or big-picture way. |
| **3. How Do People Make Decisions?** | Thinking (T) | Thinking is making decisions by stepping back from the situation, taking an objective view. |
| | or Feeling (F) | Feeling is making decisions by stepping into the situation, taking an empathetic view. |
| **4. How Do People Deal With The World?** | Judging (J) | Judging is a planned approach to meeting the deadline in a scheduled way. |
| | or Perceiving (P) | Perceiving is a spontaneous approach to meeting the deadline with a rush of activity. |

With two choices of preference on each of four dichotomies, 16 different patterns, or *types*, are possible. These types are labeled by their four-letter code, such as ESFJ or INTP. When people use the MBTI tool, they receive extensive feedback about their type and its implications for issues that are important to them. Couples, for example, are advised to respect and accommodate each other's type differences in order to improve their relationship. College students often take the MBTI at career centers, after which counselors use the results to help them make career choices. And in the business world, corporations use the tool to help work groups and managers better understand their varying working styles and preferences.

Because the MBTI aims to provide a multifaceted picture of how people respond to the world around them, it offers a framework to understand how individual differences can affect why people do what they do. As a result, it is considered by many in the business world to be an effective tool for helping people and organizations achieve better personal and professional outcomes, such as more satisfying career choices, improved communication, conflict resolution, and more functional work teams. Many organizations, including IBM, Kaiser Permanente, Southwest Airlines, Marriott, and the U.S. Air Force routinely include the MBTI as part of their process for team building, leadership, and organizational development. Understanding preferences often illuminates what energizes people, and also what drains them and therefore leads to stress and conflict. Learning to appreciate the differences in others allows people to take a different perspective and then learn to make decisions with a more inclusive outlook (see Thompson and others, 2015).

Some 2 million people take the MBTI each year, and it has remained a popular tool for over two decades. Despite its widespread use, however, it is not without critics. The primary concern underlying the critics' questions is related to the very structure of the MBTI: It is a type approach that uses forced simplistic dichotomies. Doing so—for example, labeling a person as an extravert or an introvert, or as a thinker or a feeler—forces everyone into one category or the other, which obscures the reality that traits really exist on a continuum and are not an "either/or" concept. So, a person who scores as an extravert by just one point would end up in a completely different category than someone who scored as an introvert by just one point. In reality, those two individuals would be more similar than different (as they were only two points apart from each other), but the forced dichotomy of the test structure separates them into opposite categories. Thus, the recommendations made for the two similar individuals would vary, and may ultimately not be as helpful or effective as the separate categories would be for two individuals who differed more substantially. In academic terms, then, these critics challenge the **reliability** and **validity** of the test, and only time and continued use will determine the outcome of this debate.

**KAREN HORNEY: A FEMINIST VOICE IN PSYCHODY-NAMIC PSYCHOLOGY**   Karen Horney *(HORN-eye)* and Anna Freud, Sigmund Freud's daughter, represent virtually the only feminine voices within the early decades of the psychoanalytic movement.

In this role, Horney disputed the elder Freud's notion of the **Oedipus complex** and especially his assertion that women must suffer from *penis envy* (Horney, 1939). (In fact, she proposed the concept of womb envy, suggesting that men envy women's role in giving birth to a new generation.) Instead of personality being driven by sexual urges, said Horney, we are driven by social needs. She argued that women want the same opportunities and rights that men enjoy, and asserted that many personality differences between males and females result from learned social roles rather than from unconscious urges. She also disputed Freud's contention that personality is determined mainly by early childhood experiences. For Horney, normal growth involves the full development of social relationships and of one's potential. This development, however, may be blocked by a sense of uncertainty and isolation that she called **basic anxiety**, resulting from feelings of loneliness and insignificance. It is this basic anxiety that can lead to adjustment problems and mental disorder.

**NEUROTIC NEEDS**   When basic anxiety gets out of control, people become *neurotic.* The neurotic person, said Horney (1942), suffers from "unconscious strivings developed in order to cope with life despite fears, helplessness, and isolation" (p. 40). These unconscious strivings manifest themselves in one or more **neurotic needs**, seen in Table 10.6, which are normal desires taken to extremes. We all have these desires, emphasized Horney; it is only when the desire becomes an intensive, driving force in a person's life does it become neurotic.

**Table 10.6**  Horney's Ten Neurotic Needs

| | |
|---|---|
| **1.** | Need for affection and approval |
| **2.** | Need for a partner and dread of being left alone |
| **3.** | Need to restrict one's life and remain inconspicuous |
| **4.** | Need for power and control over others |
| **5.** | Need to exploit others |
| **6.** | Need for recognition or prestige |
| **7.** | Need for personal admiration |
| **8.** | Need for personal achievement |
| **9.** | Need for self-sufficiency and independence |
| **10.** | Need for perfection and unassailability |

Horney also identified three common patterns of attitudes and behavior that people use to deal with basic anxiety: They move either *toward others*, *against others*, or *away from others.*

1. Those who neurotically move *toward others* have a pathological need for constant reminders of love and approval. Such persons may need someone to help, to take care of, or for whom to "sacrifice" themselves. Alternatively, they may seek someone on whom they can become dependent. They may end up behaving passively and feeling victimized.

2. In contrast, those who move *against others* earn power and respect by competing or attacking successfully, but they risk being feared and ending up "lonely at the top." "Better to be feared, than loved" is a theme of one of the Mafia gangsters in the movie *A Bronx Tale* that concisely depicts what Horney meant by dealing with basic anxiety with a personality style that moves *against* people.

3. Those who take the third route, moving *away from others* to protect themselves from imagined hurt and rejection, are likely to close themselves off from intimacy and support.

**EVALUATING HORNEY'S WORK**   Karen Horney's ideas were largely neglected early in her career (Monte, 1980). In 1967, though, her book *Feminine Psychology* appeared at just the right time to elevate her among those seeking a feminist perspective within psychology and psychiatry (Horney, 1967). But, having attracted renewed interest, will Horney eventually slip again into oblivion? Her ideas suffer from the same flaw that plagues the other psychodynamic theories: a weak scientific foundation. It awaits someone to translate her concepts into operational terms that can be put to a scientific test. What should be evident to you even as a young student of psychology is that all these people were big-time thinkers, theorizing in grand fashion and abstractly about human nature. They were neither oriented nor fully trained toward the type of scientific, empirical testing considered so important by experimental psychologists today.

### What analysis would Horney have made of Mary Calkins? What do you think?

We suspect she would have focused on Calkins's achievements, attempting to determine whether they were the result of a healthy drive to fulfill her potential or a neurotic need for power. Undoubtedly, Horney would have reminded us that society often praises these needs in men and punishes them in women. She would also have pointed out that much of Calkins's professional identity was shaped by having to deal with the male-centered academic world of her time. In that context, Calkins not only drew on the strength of a supportive family of her childhood but also the support of the all-female Wellesley faculty that became the "family" of her adulthood. From this point of view, it is likely that Horney may have seen in Calkins a robust and healthy personality caught in a difficult web of social constraints and contradictions.

**OTHER NEO-FREUDIAN THEORISTS**   Sigmund Freud's revolutionary ideas attracted many others to the psychoanalytic movement—many of whom, like Carl Jung and Karen Horney, broke from Freud to develop their own ideas. For the most part, the post-Freudian theorists accepted the notions of psychic determinism and

unconscious motivation. But they did not always agree with Freud on the details, especially about the sex and death instincts or the indelible nature of early life experiences. Broadly speaking, the neo-Freudians made several significant changes in the course of psychoanalysis:

- They put greater emphasis on ego functions, including ego defenses, development of the self, and conscious thought as major components of the personality— whereas Freud focused primarily on the unconscious.

- They gave social variables (culture, family, and peers) an important role in shaping personality—whereas Freud focused mainly on instinctive urges and unconscious conflicts.

- They extended personality development beyond childhood to include the life span—whereas Freud focused mainly on early childhood experiences.

One notable neo-Freudian, Erik Erikson, proposed an elaborate theory of personality development that unfolds in stages throughout the life span. This conjecture has received considerable empirical support from psychologist Sanjay Srivastava and his team (2003) at the University of Oregon. Their data show that personality continues to change well into adulthood, with people in their 20s growing more conscientious and those in their 30s and beyond gaining as they age on measures of agreeableness, warmth, generosity, and helpfulness. Erikson's views have also been much appreciated by a new generation of psychologists focusing on full life span development, beyond the earlier focus only on infant and child development. In fact, they are central to the programs of scientists now studying longevity and ways to improve quality of life at every stage of life, such as Stanford University's Laura Carstensen, who heads a center to both study and develop programs to enhance longevity. Her book *A Bright Future* (2011) is subtitled, *Happiness, Health, and Financial Security in an Age of Increased Longevity.*

In such ways, then, the post-Freudians broke Freud's monopoly on personality theory and paved the way for the new ideas put forth by the humanistic, existential, and cognitive theorists.

# 10.9: Humanistic Theories: Emphasis on Human Potential and Mental Health

**Objective:** Examine the different humanistic theories of understanding personality

Neither Freud nor the neo-Freudians had much to say about those of us who are "normal." With an emphasis on internal conflict and mental disorder, psychoanalysts offered compelling explanations for mental disorders, but largely failed to provide a usable theory of the healthy personality. The humanistic approach stepped in to fill that need with a hopeful view of human nature in place of the dark lenses of their theoretical predecessors.

Humanistic psychologists are optimistic on a grand scale. For them, personality is not driven by unconscious conflicts and defenses against anxiety but rather by positive needs to adapt, learn, grow, and thrive. They have retained the idea of motivation as a central component of personality, but they have accentuated positive motives, such as love, esteem, and self-actualization. They see mental disorders as stemming from unhealthy *situations* rather than from unhealthy *individuals.* Once people are freed from negative situations, such as negative self-evaluations ("I'm not smart"), or demeaning and debilitating relationships, jobs, or careers, the innate tendency to be healthy should actively guide them to life-enhancing choices.

## 10.9.1: Abraham Maslow and the Healthy Personality

Abraham Maslow referred to the humanistic perspective as psychology's "third force," to contrast his ideas with the psychoanalytic and behaviorist movements that had dominated psychology during most of his lifetime. He was especially concerned by the Freudian fixation on mental disturbance and maladjustment. Instead, Maslow argued, we need a theory that describes mental health as something more than just the absence of illness. That theoretical need became his life's quest. He sought the ingredients of the healthy personality where no one had ever looked for them before: in people who had lived especially full and productive lives (Maslow, 1968, 1970, 1971).

**SELF-ACTUALIZERS**   Maslow's subjects included the historical figures Abraham Lincoln and Thomas Jefferson, plus several persons of stature during his own lifetime: Albert Einstein, Albert Schweitzer, and Eleanor Roosevelt. In these individuals, Maslow found healthy personalities focused on goals beyond their own basic needs. Some, like Lincoln and Roosevelt, were oriented toward the needs of humanity. Others, like Einstein, were oriented toward understanding the natural world. Most became engaged in causes about which they felt deeply. Maslow called them all **self-actualizing personalities**. He characterized his self-actualizers as creative, full of good humor, and given to spontaneity—but, at the same time, accepting of their own limitations and those of others. In brief, self-actualizers are those who feel free to fulfill their potentialities. It is a state of being we should embrace and aspire to become.

**NEEDS IN A HIERARCHY**   Although Maslow was most interested in the healthy, self-actualizing personality, his theory of a **hierarchy of needs** also offers an explanation of

maladjustment. Maslow proposed that our needs are arranged in a priority order, from the biological needs to needs for safety, love, esteem, and self-actualization (see Figure 10.9). An unfulfilled "deficiency" need, such as a need for love or esteem, can produce maladjustment, while satisfaction of such needs allows the person to pursue interests that promote growth and fulfillment. Indeed, research shows that people who have low self-esteem may go through life feeling fearful, angry, or depressed, while those who are self-accepting lead far happier lives (Baumeister, 1993; Brown, 1991).

**Figure 10.9** Maslow's Hierarchy of Needs



### 10.9.2: Carl Rogers's Fully Functioning Person

Unlike Maslow, Carl Rogers (1961) was a therapist who often worked with dysfunctional people rather than self-actualizers. Yet he did not overlook the healthy personality, which he called the **fully functioning person**. He described such an individual as having a **self-concept** that is both positive and congruent with reality. In other words, the fully functioning person has an overall positive set of perceptions about himself, and those beliefs generally are consistent (congruent) with the way others perceive him. In addition, the fully functioning person has healthy **self-esteem**, reflecting positive feelings about oneself and one's worth.

To develop congruence, Rogers asserted that an individual needs three key ingredients in her environment.

1. *Unconditional positive regard* may be the most widely known concept of Rogers's triad and refers to receiving messages of worth from others, even when you make a mistake or cause harm. In other words, Rogers believed it was critical—especially for parents with children—to distinguish a person's behavior from their overall worth, and acknowledge that even when we make mistakes, we are still a valuable human being.

2. In contrast to unconditional positive regard are conditions of worth, which occur when a person is judged

as a "bad person" when they commit a wrongdoing. *Genuineness* is the second of Rogers's key ingredients for congruence and refers to honest feedback from others. So, for example, if your roommate borrows your car and brings it back with an empty gas tank, Rogers would suggest that you honestly tell your roommate if you are upset that the tank is empty because you expected he would pay for his own gas. In doing so, Rogers would also want you to deliver your honest feedback with **empathy**, or compassionate understanding for your roommate, recognizing that perhaps he merely forgot to fill the tank or maybe unexpectedly ran out of money. Having people in our lives that offer us this type of honest yet compassionate feedback helps us learn that our flaws and inconsistencies do not diminish our essential worth. This understanding, in turn, enables us to accept our mistakes and work through them and grow (as opposed to feeling like our wrongdoings make us "bad apples," which leads to hiding them from ourselves and others, in turn keeping us from being able to address them). If we don't see them, we can't address them, and work at improving ourselves. For Rogers, then, this type of honest and empathic feedback is essential for growth and congruence.



Parents who respond to their children's feelings with empathy and unconditional positive regard develop more trusting relationships with them. These responses also help the children feel empowered to overcome their mistakes and be kinder to others.

3. Another key component of Rogers's insightful views is our need for consistency. As humans, we are most comfortable when incoming information fits our preexist-

ing notions. So, when we encounter information—especially about ourselves—that contradicts or challenges some element of our self-concept, our tendency is to skew the incoming information to reduce the inconsistency and keep our positive self-esteem intact. For example, if you are the roommate who borrowed the car and used up all the gas, your first instinct might be to point out all the perfectly good reasons you may have done that—thus keeping the notion that you made a mistake at bay. The problem with this, according to Rogers, is that our need for consistently and its accompanying cognitive biases interferes with our efforts to become congruent. We end up rejecting information when it doesn't fit our preconceived notions about ourselves; doing so limits constructive modifications in our attitudes and action.

**THE PHENOMENAL FIELD: THE PERSON'S REALITY** Rogers's emphasis on self-concept and self-esteem urged psychologists to recognize the importance of perceptions and feelings in a person's viewpoints, which Rogers called the **phenomenal field**. We respond only to this subjective experience, not to an objective reality; that is why, for example, a student's reaction to a grade depends entirely on her or his perception of the personal meaning of that letter grade. Receiving a C may shock a student who is used to receiving As but thrill one who has been failing: Both are reacting to their own subjective phenomenal fields. In Rogers's system, then, the phenomenal field is part of the personality, as a sort of filter for our experiences. It contains our interpretations of both the external and internal worlds, and it also contains the *self*—the humanists' version of the Freudian ego—including both the self-concept and self-esteem, as well as the **ideal self**.

Another key component of Rogers's insightful views is our need for consistency. As humans, we are most comfortable when incoming information fits our preexisting notions. So, when we encounter information—especially about ourselves—that contradicts or challenges some element of our self-concept, our tendency is to skew the incoming information to reduce the inconsistency and keep our positive self-esteem intact. For example, if you are the roommate who borrowed the car and used up all the gas, your first instinct might be to point out all the perfectly good reasons you may have done that—thus keeping the notion that you made a mistake at bay. The problem with this, according to Rogers, is that our need for consistently and its accompanying cognitive biases interferes with our efforts to become congruent. We end up rejecting information when it doesn't fit our preconceived notions about ourselves; doing so limits constructive modifications in our attitudes and action.

**CONDITIONAL VERSUS UNCONDITIONAL RELATIONSHIPS** Interestingly, Rogers himself had an unhappy and dysfunctional childhood, dominated by the rigid rules of his parents' strict religious beliefs. So restrictive was this environment that he once remarked that he felt "wicked" when he first tasted a bottle of soda pop without his parents' knowledge (Rogers, 1961). Later, from an adult perspective, Rogers concluded that children from homes like his, where parental love is *conditional* (dependent) on good behavior, may grow up with excessive anxiety and a strong sense of guilt that leads to low self-esteem and even over time to mental disorder. Instead of parental "guilt-mongers," he believed, we need people who can give us unconditional positive regard—love without conditions attached. More often mothers tend to give their children such unconditional love, while fathers tend to give their love conditionally, based on performance, and ideally successes in different domains.

Unlike the psychodynamic theorists who focused on sinister motives, Rogers, Maslow, and other humanistic personality theorists believe that our most basic motives are for positive growth. In its healthiest form, self-actualization is a striving to realize one's potential—to develop fully one's capacities and talents. According to the humanistic theorists, this innate quest is a constructive, guiding force that moves each person toward positive behaviors and the enhancement of the self.

**A HUMANISTIC PERSPECTIVE ON MARY CALKINS** A humanist trying to understand what drove Mary Calkins would probably begin by asking: How did she see her world—and herself? What mattered to her? They would be especially interested in her strengths, and her social environment: her intelligence, her nurturing family background, and her supportive circle of colleagues at Wellesley and in the psychology group at Harvard. They would also note that Calkins worked all her life to make psychology the science of the self (by which she meant the whole person, not the fragmented and narrow approach of the structuralists or the "mindless" approach of the behaviorists of that era). In this respect, Mary Calkins might be considered one of the pioneers of humanistic psychology.

## 10.9.3: Evaluating the Humanistic Theories

The upbeat humanistic view of personality brought a welcome change for therapists who had wearied of the dark, pessimistic Freudian perspective with its emphasis on unspeakable desires and repressed traumas. They liked the humanistic focus on making one's present and future life more palatable rather than dredging up painful memories

of an unalterable past. They also liked its attention to mental health rather than mental disorder.

**ARE HUMANISTIC THEORIES "SELF"-CENTERED?**
But not everyone jumped on the humanists' bandwagon. Many critics chided the humanists for their fuzzy concepts:

- *What exactly is "self-actualization," they asked?*
- *Is it an inborn tendency, or is it created by one's culture?*

And, added the psychoanalysts, the humanistic emphasis on conscious experience does not recognize the power of the unconscious. Finally, cross-cultural psychologists criticized the humanists' emphasis on the self—as in *self*-concept, *self*-esteem, and *self*-actualization. This "self-centered" picture of personality, they noted, may merely be the viewpoint of observers looking through the lens of an individualistic Western culture that is alien to non-Western views where community and family are more vital than any selfhood (Heine and others, 1999).

We should be clear: No one denies the existence of a self within the personality; that is, some sort of process that distinguishes the individual from everything else. We all distinguish "me" from "thee." In fact, MRI and PET scans demonstrate the existence of specialized brain modules related to processing thoughts about the self (Heatherton and others, 2004). And even in collectivistic cultures, the self exists, although the emphasis is on a self embedded in a social context. The real issue, then, is whether the self should be the centerpiece of personality or is more accurately seen in a supporting role.

**POSITIVE PSYCHOLOGY: THE NEW HUMANISM?**   In the past decade, a movement known as **positive psychology**, pioneered by psychologist Martin Seligman, was formed to pursue essentially the same goals established by the humanists. The difference is that those allied with positive psychology are more concerned than were most humanists about laying a scientific foundation for their theories, with greater precision for specific terms in the lexicon that comprise human strengths and virtues (Peterson & Seligman, 2004). This ever-expanding "fourth force" has produced important work on happiness, social support, health, and well-being. Even so, the positive psychology movement itself is limited as an all-purpose explanation of personality by its restricted focus on only the desirable aspects of human functioning. In a sense, it is similar to the Dalai Lama's emphasis on becoming a compassionate person, which is perhaps one of the noblest personal virtues, but fails to recognize its function in a world filled with evil of all kinds. That positive self-oriented compassion must be transformed into heroic *action*, it must be socially engaged, and go beyond nice thoughts and emotions, if it is to become a mechanism for social and political change.



Author Phil Zimbardo being greeted by the Dalai Lama, prior to their public dialogue about the importance of compassion. Zimbardo maintains that in order to challenge evil in the world, the personal virtue of compassion must be transformed into the civic virtue of heroic action.

So, is there an alternative view that overcomes the problems we have seen in the psychodynamic, humanistic, and the new positive psychology theories?

# 10.10:  The Existential Approach: Finding Meaning in Existence

**Objective:**  **Relate the concept of hardiness to the existential approach to understanding personality**

Let us imagine the unimaginable. Your government declares that you are "undesirable" because of your religion, race, ethnicity, or political views. Next, you and your family are sent to a concentration camp where children, elderly, and sick people are immediately killed. All of your possessions are taken away; a prison number is tattooed on your arm as your new identity. You will work long hours at slave labor, trying to survive on a starvation diet. Many around you die, but some like you survive this ordeal that continues over several years. In the Auschwitz camp in Poland, 1.5 million people died from such inhumane brutality by the Nazis, as did millions more from dozens of nations in other slave labor camps all over Europe. For some who died it was not a matter of too much work and too little food, but rather from a psychological mentality of looking to the past to make the horrific present less real, instead of focusing on future goals. In contrast, some of

those who survived developed a "tragic optimism" of reconceptualizing the daily difficulties of camp life as opportunities to grow spiritually and as a test of their inner strength. Instead of bringing their past memories into the present, they focused on opportunities in the present that could help them realize future goals.

This analysis emerged from the personal experiences of a young psychiatrist trying to understand the differing mentalities of those prisoners who gave up and perished and those who survived by finding new meaning in their existence. Viktor Frankl's personal camp experiences are described elegantly in his remarkable treatise, *Man's Search for Meaning* (1959/2014). Frankl outlines the core ideas of Existential psychology and also the therapeutic approach derived from it, called Logotherapy.

For Frankl, "Logotherapy, indeed, is a meaning-centered psychotherapy" (p. 92). It treats anxiety as not necessarily pathological, but normal when it is anxiety about one's very existence, about matters of life and death, which are part of the human condition. Existential psychology focuses on building **existential courage**, as the therapist helps patients search for meaning in their lives (Frankl, 1967).

For existential psychologists, the search for meaning in life is the primary motivation for every human being. The quest to find such personal meaning is unique and specific to each person. The force for such a search is described by Frankl as the "*will to meaning.*" In contrast with psychoanalysis, Logotherapy is less concerned with the unconscious. It is also less focused on past traumas that one cannot change, in favor of changing one's future, specifically, on the meaning of the *patient*'s life from the present onward. The patient is encouraged to identify future desired states that he or she wants to help achieve by focused planning of the pathways on that journey.

Existential researcher and theorist Sal Maddi (2006), at the University of California, Irvine, pioneered the concept of **hardiness**, which involves:

1. The existential courage to think of stressful situations as opportunities to grow and develop by what you learn
2. The motivation to do the hard work to make this happen

In trying to understand better the various levels of performance of West Point Military Academy cadets, in their 4 years of intentionally stressful experiences, Maddi's team (Maddi and others, 2012) found that hardiness is a better predictor of enhanced performance and retention than is "grit." *Grit* is defined as manifesting goal-perseverance and resilience in the face of adversity. Whereas hardiness is existential courage, grit involves having a particular goal that you will not change, no matter what. So, existential courage seems more useful. Maddi's notion of existential courage is more focused on constructive actions to take

in immediate challenging situations than Frankl's more generic view of imagining an optimistic future and reasoning back to what can be done now to realize it.

### 10.10.1: Evaluating the Existential Approach to Personality

Unlike the other approaches to personality, the existential approach is heavily based in philosophy and philosophical views of meaning, existence, and finding personal courage to meet life's challenges. Its treatment component is centered on a future orientation, in contrast to the past focus of psychoanalysis and the more present focus on reward contingencies in learning-cognitive based theories of personality and treatment. In its use by Maddi, *hardiness* becomes a core attribute that can be measured and can also be trained. Furthermore, existential psychology is gaining increasing scientific support, thus expanding its value in the field of personality psychology.

**How would existential psychologists evaluate Mary Calkins? What do you think?**

They would have seen her entire existence as a struggle against many antagonistic forces that she had to challenge repeatedly. Mary clearly developed the existential courage to fight on despite rejections. She exemplifies what it means to have a hardiness core to her personality.

## 10.11: Social-Cognitive Theories: Emphasis on Social Learning

**Objective:** Evaluate the contributions of social-cognitive theories to understanding personality

To understand why we must put up with those tamper-proof seals on pill bottles, we need to go back a few years to 1982, when someone (the case is still unsolved) slipped cyanide into a batch of Tylenol capsules. The result was seven deaths. And before manufacturers could get those pesky new seals in place, several copycat attempts to contaminate other drugs occurred. Sales of those drugs plummeted, so observers speculated that the motive—held maybe by competitors, not just psychopathic individuals—was to bankrupt certain drug companies.

The personality-related question is this: Can we explain these despicable acts entirely by looking at unconscious motives, selves failing to be actualized or fully functioning, or lack of meaning in life? Social-cognitive theorists answer with a resounding, "No!" We must take learning into account—*social learning*, to be more precise. In fact, we

must consider the full range of psychological processes, including cognition, motivation, and emotion, as well as the environment (Cervone, 2004). Here, we will sample two of these approaches.

## 10.11.1: Observational Learning and Personality: Bandura's Theory

You don't have to yell "Fire!" in a crowded theater to know what would happen if you did. Stanford University's Albert Bandura maintains that we are driven not just by inner motivational forces or even by receiving external rewards and punishments, but by our *expectations* of how our actions might gain us rewards or cost us pains. And many of those expectations, he notes, don't come from direct experience but rather from observing what happens to others (Bandura, 1986). Thus, a distinctive feature of the human personality is the ability to foresee the consequences of actions, particularly in learning what happens to others when they behave in certain ways.

Perhaps this is the most important contribution of Bandura's theory: the idea that we can learn *vicariously*; that is, from others. This social learning, or **observational learning**, is the process by which people learn new responses by watching each other's behavior and noting its consequences. In other words, others act as role models that we either accept or reject, depending on whether they are rewarded or punished for their behavior. In Bandura's view, then, personality is a collection of *learned* behavior patterns, many of which we have borrowed by observational learning.

Through observational learning, children and adults acquire information about their social environment. Likewise, skills, attitudes, and beliefs may be acquired simply by noting what others do and the consequences that follow. Understanding the whole person means understanding the continued interaction among behavior, cognition, and the environment. He calls this **reciprocal determinism** (Bandura, 1981, 1999).



As Bandura's theory suggests, children develop a clearer sense of identity by observing how men and women behave in their culture.

**How does reciprocal determinism work in real life?** If, for example, you like psychology, your interest (a cognition) will probably lead you to spend time in the psychology department on campus (an environment) interacting with students and faculty (social behavior) who share your interest. To the extent that you find this stimulating and rewarding, this activity will reciprocally strengthen your interest in psychology and encourage you to spend more time in the psychology department. Each of the three elements— behavior, cognition, and the environment—reinforces the others. You can see the simple but powerful relationship among these variables in Figure 10.10.

**Figure 10.10** Reciprocal Determinism

In reciprocal determinism, the individual's cognitions, behavior, and the environment all interact.



## 10.11.2: Locus of Control: Rotter's Theory

Another cognitive psychologist, Julian Rotter (rhymes with *voter*) developed a hybrid theory based on our sense of personal power or **locus of control**. Perceived locus of control, then, acts as a sort of filter through which we see our experiences and as a motive for action or inaction. Thus, Rotter's theory is both a trait theory and a "process" theory that focuses on a single but important dimension of personality.

To illustrate, we ask you this question: *When you ride in a car, do you always use a seat belt, or do you think that being hurt or killed in an accident depends on when your "number comes up"?* If you always use the belt and automatically click it every time you get into a car as driver or passenger, you probably have an **internal locus of control** because by doing so you are exerting some control over your fate. On the other hand, if you have a fatalistic feeling that you have no control over the events in your life, that whatever will be, will be, you probably don't buckle up (except to avoid being fined where it is illegal not to do so). In that case, you have an **external locus of control**.

Scores on Rotter's *Internal–External Locus of Control Scale* correlate with people's emotions and behavior in many situations (Rotter, 1990). For example, those with an

internal locus of control not only are more likely to get good grades, but also are more likely to exercise and watch their diets than are externals (Balch & Ross, 1975; Findley & Cooper, 1983).

Many studies suggest that locus of control is an important characteristic of our personalities; that is, an internal or external disposition seems to be a reliable personality characteristic—although Rotter resists calling this a *trait* because he believes the term conveys the erroneous idea that internality–externality could be fixed and unchangeable. It is also quite likely that your own locus of control varies with different situations in your everyday life. If you are a good student, smart, and get good grades, you are internal in academic settings. But if you are overweight and come from a family where obesity is common, you are also likely to be external in restaurants and wherever tasty but unhealthy food is presented to you. You can capture the flavor of Rotter's Locus of Control Scale by following the instructions in the *Do It Yourself!* box.

## Do It Yourself!
## Finding Your Locus of Control

Julian Rotter (1966) has developed a test that assesses a person's sense of internal or external control over events. The test items consist of pairs of contrasting statements, and subjects must choose one statement with which they most agree from each pair. This format is called a forced-choice test. Unlike many other personality tests, the scoring for each item on Rotter's Internal–External Scale is transparent: The test-taker can easily tell in which direction most items are scored. Here are some items from a preliminary version of the test (Rotter, 1971).

You can see which direction you lean by counting up the number of statements with which you agreed in each column. Agreement with those in the left column suggests an internal locus of control.

| | | | |
|---|---|---|---|
| **1a.** | Promotions are earned through hard work and persistence. | **1b.** | Making a lot of money is largely a matter of getting the right breaks. |
| **2a.** | In my experience I have noticed that there is usually a direct connection between how hard I study and the grades I get. | **2b.** | Many times the reactions of teachers seem haphazard to me. |
| **3a.** | If one knows how to deal with people, they are really quite easily led. | **3b.** | I have little influence over the way other people behave. |
| **4a.** | People like me can change the course of world affairs if we make ourselves heard. | **4b.** | It is only wishful thinking to believe that one can really influence what happens in society at large. |
| **5a.** | I am the master of my fate. | **5b.** | A great deal that happens to me is probably a matter of chance. |

### 10.11.3: Evaluating the Social-Cognitive Approach to Personality

Critics argue that the cognitive theories generally overemphasize rational information processing and overlook both emotion and unconscious processes as important components of personality. So for those who feel that emotions and motives are central to the functioning of human personality, the cognitive approaches to personality have a blind spot. However, because emotion and associated unconscious processes have assumed a greater role in cognitive psychology recently, we can anticipate a new generation of cognitive theories of personality that do take these aspects of personality into account (Mischel & Shoda, 1995).

The real strength of the social-cognitive theories is their foundation of solid psychological research—unlike most of the ideas proposed by the Freudians, neo-Freudians, and humanists. You will recall, for example, Bandura's famous **Bobo doll experiment** in observational learning. The price paid for the social-cognitive theories is that they are much less comprehensive than the old and grand theories of personality proposed by Freud and his successors. The payoff, however, has come in the form of both explanations and specific treatments for a number of mental disorders that often seem to involve observational learning—particularly anxiety-based disorders, such as phobias, and behavior disorders in children.

**Finally, we might ask how a cognitive psychologist would explain Mary Calkins. What's your opinion?**

One focus would be on how she interpreted the rewards and punishments she experienced in trying to complete her graduate work in psychology, and how these interpretations shaped her behavior. A cognitive theorist might note that Calkins obviously had an internal locus of control that was part of a reciprocal interaction with the social support she received at home, at Wellesley, and from her mentors at Harvard—which, in turn, reinforced her determination and hard work. And, they might add, Mary Calkins became a role model for the women who came after her to study psychology.

## 10.12: Current Trends: The Person in a Social System

**Objective:** Recall three important new trends in our thinking about personality

Gone are the days when Freud, Jung, Horney, and others were building the grand, sweeping theories of personality that attempted to explain everything we humans do. First the humanistic and later the existential and cognitive theorists arose to point out blind spots in the older psychodynamic theories. Now the emphasis has shifted again, as

psychologists have brought elements of all the major perspectives together with new knowledge about the impact of culture, gender, and family dynamics. You should be especially aware of three important new trends in our thinking about personality.

1. In **family systems theory**, for example, the basic unit of analysis is not the individual but the family (Gilbert, 1992; Mones & Schwartz, 2007). This perspective holds that the ways people interacted first in their family and, later, in their peer groups shape personality. While Freud and others did recognize that parents influence children, the new emphasis is on *interaction*—on the ways that members of the family or the peer group influence each other. This has led to viewing people with psychological problems as individuals embedded in dysfunctional groups rather than as "sick" persons. This emphasis has also given us a new interpersonal language for personality. We often speak now of *codependence* (instead of dependent personalities) and *communication* (instead of mere talk). We also have a heightened awareness of relationships and process (the changes that occur as relationships develop).

2. A second trend comes from psychology's increasing awareness of cultural differences, as more and more publications on personality come from psychologists around the world—not just from Europe and America (Quiñones-Vidal and others, 2004). Psychologist Stanley Sue (1991) also reminds us that our own society is becoming ethnically more diverse. No longer can we assume that everyone we meet shares the same cultural experience or the same values. This also means that psychologists must be sensitive to the role of cultural factors both in shaping personality and in contributing to the mental health and illness of ethnically and racially diverse people (Sue, 1983).

3. A third trend comes from an increasing appreciation of gender influences. While we do not know the weights to assign nature and nurture in our attempts to understand gender differences, we do know that males and females often perceive situations differently (Tavris, 1991). We have also seen that males tend to be more physically aggressive than females. And females tend to form close relationships in small, equal-status groups, while males tend to connect in larger groups (teams) organized hierarchically with leaders and followers. Men compete, while women cooperate. One reason video games are so much more attractive to men than to women is their focus on competition, dominance, socially isolated gaming, and also their violent content. (They are also designed by largely male teams in large corporations.)

Together, these three trends have enlarged our understanding of the forces that shape personality. The new emphasis includes attention to diversity and group processes in addition to traits and mental processes of individuals. As a result, the picture of personality has become much more complex—but it is becoming far more realistic. Accordingly, new research reveals that personality traits thought to be relatively fixed can be dramatically altered by social-economic conditions that men and women respond to differently.

Unemployment, for example, has been a worldwide phenomenon since the economic crash of 2008. Many people, in fact, define themselves by their work. You are your job identity.

*So what happens when one becomes unemployed?* Core aspects of personality can be affected, making some less agreeable, less conscientious, and less open, on the **Big Five traits**, in turn making it more difficult to find new jobs. Researchers in the U.K. examined a large sample of more than 6,000 German adults (both men and women in approximately equal numbers) who took the Big Five inventory twice over 4 years between 2006 and 2009.

- Initially, unemployed men became more agreeable than those who never lost their jobs, but the **agreeableness** diminished dramatically over time without work. For women, agreeableness steadily declined each year of unemployment.

- **Conscientiousness** lessened the longer men had no job, while unemployed women initially increased on that trait, perhaps because they pursued non-work related gender-based activities at home and in their community.

- **Openness** also decreased the longer men were unemployed, but women's decline in that trait rebounded in the fourth year.

The lead researcher offers this new perspective on public policy and personality:

> "Public policy therefore has a key role to play in preventing adverse personality change in society through both lower unemployment rates and offering greater support for the unemployed" (Boyce and others, 2015).

## Psychology Matters

# Using Psychology to Learn Psychology

Although an internal or external **locus of control** can be a central feature of your personality, your perceived locus of control can also change from situation to situation. When you are speaking in front of a group, you may feel that the

situation is beyond your control, yet when you are behind the wheel or on skis, you may feel that you are fully the master. And what about your education? Do you have a sense of internal or external control with regard to—say—your grade in psychology?

An external locus of control about grades poses a danger for the college student because college life is so full of distractions and temptations. If you believe that your grades are largely beyond your control, you can easily be driven by the enticements of the moment and let your studies slide. This attitude can, of course, become a **self-fulfilling prophecy** that ruins your grades not only in psychology but across the board.

The following questions will help you assess your own academic locus of control:

- On a test do you often find that, even when you know the material, anxiety wipes the information from your memory?
- Do you often know the material well but perceive that the test is unfair or covers material that the professor did not indicate would be on the test?
- Are you so easily distracted that you can never quite get around to studying?
- Do you believe that some people are born to be good students and some are not?
- Do you feel that you have no control over the grades you receive?
- Do you feel that you are not smart enough to cope with college-level work?
- Do you feel that success in college is largely a matter of playing up to the professors?

If you answered "yes" to several of these questions, then you probably have an external locus of control with respect to your college work—an attitude that can hamper your chances of college success. What can be done? Nothing—if you are completely convinced that your success in college is beyond your control. If, however, you are open to the idea of establishing more control over your college experience, here are a few suggestions:

- If you experience test anxiety, get help from your counseling center or learning resources center.
- Form a study group among friends taking the same classes, or find a tutor at your learning resources center.
- Talk to your professors individually: Ask them to give you some pointers on what they consider to be especially important in their classes. (But don't ask, "What's going to be on the test?")
- Go to your school's learning resources center, and get an assessment of your strengths and weaknesses and of your interest patterns. Then make a plan to correct your weaknesses (e.g., with tutoring or with remedial classes in your weak areas). At the same time, build on your strengths by selecting a major that capitalizes on your aptitudes and interests.

We would wish you good luck—but only an externalizer would want that!

# Key Question: What "Theories" Do People Use to Understand Themselves and Others?

**Core Concept 10.4**

**Our understanding of ourselves and others is based on implicit theories of personality and our own self-narratives—both of which are influenced by culture.**

We have seen how psychologists view personality. But how do ordinary people go about understanding each other? And how do they understand themselves? All of us regularly make assumptions—right or wrong—about other people's personalities as well as our own. You do so when you go on a date, apply for a job, or form your first impression of a professor or classmate. We might also wonder whether people in other cultures make the same assumptions about personality that we do. These issues are significant because the "folk theories," or **implicit personality theories**, that people use to understand people can support or undermine relationships among individuals—or even among nations. Our core concept puts it this way:

Our understanding of ourselves and others is based on implicit theories of personality and our own self-narratives—both of which are influenced by culture.

Let's look first at the implicit theories we use to understand others before moving on to consider how we understand ourselves.

By the end of this section, you will be able to:

**10.13** **Explain the importance of implicit personality theories**

**10.14** **Recall why self-narrative is a component of personality**

**10.15** **Evaluate the influence of the culture-components of individualism and collectivism on personality**

# 10.13:  Implicit Personality Theories

**Objective:**  **Explain the importance of implicit personality theories**

Think of someone who has been a role model for you. Now think of someone you can't stand to be around. In both cases, you associate those individuals with personal traits: honesty,

reliability, sense of humor, generosity, outgoing attitude, aggressiveness, moodiness, pessimism, and so on. Even as a child, you had a rudimentary system for appraising personality. You tried to determine whether new acquaintances would be friend or foe; you worked out ways of dealing with your parents or teachers based on how you read their personalities.

In each case, your judgments were personality assessments reflecting your **implicit personality theory**, your personal explanation of personality that almost certainly relied on connecting people's behavior with the traits you attributed to them. Like **implicit memories**, our implicit theories of personality operate in the background, largely outside of our awareness, where they simplify the task of understanding other people (Fiske & Neuberg, 1990; Macrae and others, 1994).

Most of the time, implicit theories work well enough to make social relationships run smoothly—at least in familiar environments. While our expectations can easily miss the mark in unfamiliar cultures, in more familiar territory our implicit theories of personality help us anticipate people's motives and behavior, allowing us to perform our work, buy our morning mochas, pass our courses, and interact with our friends. In some respects, our implicit theories may not be all that different from the **five-factor theory**. According to a study in which college students rated the personalities of other students they had observed but didn't know, their impressions agreed remarkably well with scores derived from the Big Five inventory (Mehl and others, 2006). There was one interesting exception: Assertive or argumentative behavior was seen by the raters as a sign of emotional stability in men but as indicating emotional *instability* in women!

Implicit theories can have other blind spots, too. They may err by relying on naive assumptions and stereotypes about traits and physical characteristics (Hochwalder, 1995). So hefty people may be assumed to be jolly or blondes a little short on intellect. Similarly, we may erroneously assume certain traits always go together—creativity and emotional instability, for example.

Implicit theories may also give bad predictions when people's motives and feelings influence their judgment of others' personalities, as Freud suggested with his concept of *projection.* Accordingly, a person who is feeling angry, happy, or depressed may naïvely assume that other people are feeling the same way, too.

Finally, people's implicit theories may conflict on the issue of whether personality traits are fixed or changeable. As you might expect, those believing in fixed traits are more likely to see others as stereotypes (e.g., "all Italians are alike") than are those whose implicit theories assumed the malleability of personality (Levy and others, 1998; Molden & Dweck, 2006). And consider the impact that either assumption—personality as fixed or changeable—could have on how parents raise their children, teachers respond to certain students, and coaches, trainers, and business leaders deal with success or failures of their players and personnel.

## 10.13.1: The Dangers of a Fixed Mindset Narrative

Carol Dweck (2006, 2007) has discovered in her 20 years of research on this issue that our **mindset** is not just a sideshow of personality; it is a major aspect of our entire mental world. It helps shape our goals; it influences whether we become optimistic or pessimistic about our future, and even whether we are likely to fulfill our potential. What happens when you, your parents, teachers, or coaches believe that any particular ability or talent is "*fixed*"—you have it or you do not? And say you and they believe you are one of the special ones who has IT. You are a musical prodigy as a child, a super track star, or a gifted writer. With abilities "fixed by nature," you are entitled to succeed without having to break a sweat. So you are likely to work less hard, practice less, and then you even do well initially when the competition is rather low level. On the other side of aisle is the kid with the "*growth*" mindset: He and others in his corner share the view that any talent or ability is in a constant state of development and can be improved with intensive practice and hard work. Next, assume that both fail to meet some goal. The growth-mindset kid realizes it is essential to work harder and practice more hours to get ahead, in contrast to the fixed-mindset kid who comes to feel inadequate, as less than advertised, as letting down all those who believed in her or his innate superiority. You can hear Professor Dweck's outstanding TED talk, "The Growth Mindset: Believing You Can Improve" by clicking on the link we have provided at the end of this chapter.

Popular author Malcolm Gladwell builds on such ideas in his bestseller *Outliers* (2008), to inform us all that the single major difference between those youths who were praised as child prodigies and succeeded versus those who failed to realize their assumed potential is 10,000 hours of practice! But new psychologically based interventions can change mindsets in a short time and thereby boost achievement and reduce achievement discrepancies across many domains from math to athletic performance (Dweck, 2008).

# 10.14: Self-Narratives: The Stories of Our Own Personalities

**Objective:** Recall why self-narrative is a component of personality

How do you respond when someone says, "Tell me about yourself"? You probably reply with a few sentences about where you are from, what you like to do with your leisure time, and what your occupational goals are. But what do you say when you ask yourself the same question? The

"story" that you tell yourself about yourself is what psychologist Dan McAdams (2006) calls a **self-narrative**. He claims that the self-narrative is just as important a component of personality as are motives, emotions, or social relationships. The self-narrative is really a broader conception of the self-concept: It is the story of the self-concept over time. The self-narrative serves as the common thread that holds the elements of personality together, like beads on a necklace. And, says McAdams, our identity depends on keeping this narrative going throughout our lives, to give us a sense of unity and purpose.

Culture, of course, has a big effect on the self-narrative stories we *want* to tell ourselves. While McAdams hasn't yet done extensive cross-cultural research, he has identified a peculiarly important self-narrative in the American culture. He calls it the **redemptive self**.

Not everyone's self-narrative follows the redemptive self pattern, of course. But McAdams often finds a pattern like this in *generative* adults, a term originally used by developmental psychologist Erik Erikson to describe healthy, productive adults. More specifically, generativity refers to adults who are committed to something outside themselves—to the community and to the welfare of future generations. It remains to be seen what narratives characterize healthy adults in other cultures.

# 10.15:  The Effects of Culture on Our Views of Personality

**Objective:**  Evaluate the influence of the culture-components of individualism and collectivism on personality

As we have seen, Westerners tend to put the *individual* or the *self* at the center of personality. While people the world over do make the assumption of a distinct self, much of the world—especially those in collectivist cultures—assumes that the self is embedded in a larger social network. They further assume that individuals cannot be understood in isolation from others with whom they have some sort of relationship—which brings us to cross-cultural researcher Harry Triandis.

## 10.15.1:  Individualism, Collectivism, and Personality

According to Triandis (1995), cultures differ most fundamentally on the dimension of **individualism** versus **collectivism**. For those raised in the Euro-American tradition, the individual is the basic unit of society, while those raised in many Asian, South American, and African cultures emphasize the family or other social groups. In collectivistic cultures, people tend to form identities that blend harmoniously with the group, and they expect that others are motivated to do the same. In individualistic cultures, people think of themselves as having a unique identity, independent of their social relationships (Pedersen, 1979). Thus, for Euro-Americans, the self is a whole, while for many Asians and Africans the self is only a part (Cohen & Gunz, 2002).

New cross-cultural research, however, has shown that Asian cultures are less uniformly collectivistic than previously thought. People from northern China, it seems, show a strong streak of individualism, while those from the south are more collectivistic. The best explanation, according to lead researcher Thomas Talhelm, is the "rice theory." Maintaining the complex, centuries-old system of canals and social arrangements for sharing the water required for growing rice, Talhelm explains, requires a far higher level of cooperation than does the wheat-growing culture in the north, where farmers rely only on rainfall (Doucleff, 2014; Talhelm and others, 2014). We hasten to add that the rice theory is based on a correlation—which means we cannot be sure that the historic farming patterns have actually *caused* the cultural differences observed. And, we must remember that this is only one study. But surely there will be more to come—to see whether the rice theory holds water . . . so to speak.

Let us be clear: Neither the individualistic nor the collectivistic approach is "better." Each has advantages and disadvantages from different perspectives. The collectivist cultures encourage group effort, typically for the benefit and glory of the group—often a work group or a family group. On the other hand, a person such as Mary Calkins, who challenged society's norms, would be more likely to thrive in an individualistic culture.

**HOW CULTURE INFLUENCES PERSONALITY**  Many aspects of peoples' personalities and behavior derive from their culture's position on the individualism versus collectivism spectrum. So, in judging people, Americans and Europeans tend to make the **fundamental attribution error or FAE**. This bias is twofold: *it overestimates the dispositional (internal) causes of behavior, while simultaneously underestimating the social-situational (external) factors.* This misperception stems from the assumption that other people's actions, especially annoying, clumsy, inappropriate, or otherwise undesirable behaviors, result from their personalities rather than from the situation. If you come to your psychology class late, other students are likely to assume that you are a "late" or disorganized person—if you are at an American college or university. But if you arrived late to a psychology class in China or Japan, the students there would be more likely to assume that your behavior had some external cause, such as traffic problems. In general, the fundamental attribution error is less common in group-oriented, *collectivistic* cultures, such as are found in Latin American and Asia (Church and others, 2005; Lillard, 1997).

Cultures differ on other dimensions, too. For example, when given the choice of competition or cooperation, individualistic Americans characteristically choose to compete (Aronson, 2004; Gallo & McClintock, 1965). Americans, on average, also score higher on measures of need for achievement than do people in collectivist cultures.

Cultures also differ in their views of the "ideal personality" (Matsumoto, 1996). In the Western psychological tradition, mental health consists of integrating opposite and conflicting parts of the personality. This can be seen especially clearly in Freudian and Jungian theory. By contrast, some Asian psychologies, particularly those associated with Buddhism, seek the opposite: to dissociate consciousness from sensation and from memories of worldly experience (Gardiner and others, 1998; Pedersen, 1979).

Here is a short list of other personality-related dimensions on which people differ around the world:

- **Status of different age groups and sexes:** The status of the elderly is higher in many Asian and Native American cultures than in the United States; women have second-class status in many non-Western societies (Segall and others, 1999).

- **Romantic love:** While love and affection occur in all cultures, the assumption that romantic love should be the basis for marriage is a historically recent European invention and is most often found in individualistic cultures (Hatfield & Rapson, 1998; Rosenblatt, 1966).

- **Expression of feelings:** Asian cultures teach people to suppress the expression of intense feelings (Tsai & Uemura, 1988), while Euro-Americans are much more likely to express strong emotions (although there can be pronounced gender differences).

- **Locus of control:** Persons in industrialized nations, such as the United States and Canada, more often have an internal locus of control than do those in developing countries, such as Mexico or China (Berry and others, 1992; Draguns, 1979; Shiraev & Levy, 2004).

- **Thinking versus feeling:** Many cultures (e.g., in Latin America) do not make the strong distinction between thoughts and emotions that Americans do (Fajans, 1985; Lutz, 1988).

- **Social harmony:** Asian cultures seek harmony in social interactions that seem to be just conformity by Western observers, while the latter prize uniqueness in social comparisons that appear as deviance to Asian observers (Kim & Markus, 1999).

**Despite these differences, can we say that people are fundamentally the same the world over? What's your opinion?**

On the level of neurons and brain circuits, the answer is certainly "yes." But personality is also locked in the embrace of culture, so a more comprehensive answer would be "no—but perhaps they can be described on some of the same dimensions." Culture refers to those aspects of a society that all its members share, are familiar with, and pass on to the next generation. "Personality" refers to unique combinations of traits that differentiate individuals within a culture (Brislin, 1981, pp. 51–52).

But don't forget that culture and personality interact. A culture shapes the personalities of the individuals within it, just as individuals can influence a culture. So, your personality is, to a certain extent, a product of your society's values, attitudes, beliefs, and customs about morality, work, child-rearing, aggression, achievement, competition, death, and dozens of other matters important to humans everywhere. In the broadest sense, then, a culture is the "personality" of a society (Benedict, 1934).

---

## Psychology Matters

# When Personalities Become Disordered

Disorders of personality account for the quirkiness of many historical and public figures, including the much-married King Henry VIII, numerous Hollywood bad boys and girls, and the fatal femme Lizzie Borden, who famously dispatched her parents with a hatchet. The **personality disorders** show up in chronic patterns of poor judgment, disordered thinking, emotional disturbances, disrupted social relationships, or lack of impulse control (Clark, 2009). The key element is a maladaptive personality pattern of long standing. Here, we consider three of the better-known such conditions:

1. *Narcissistic Personality Disorder*
2. *Antisocial Personality Disorder*
3. *Borderline Personality Disorder*

## Narcissistic Personality Disorder

In Greek mythology, Narcissus was a man so enamored of his own good looks that, while admiring himself in a reflecting pool, he fell in and drowned. His sad legacy is the name for a disorder involving an exaggerated sense of self-importance, a need for constant attention or admiration, and often a preoccupation with fantasies of success or power. People with **narcissistic personality disorder** may respond inappropriately to criticism or minor defeat. They usually have problems in interpersonal relationships, feel entitled to favors without obligations, exploit others selfishly, and have difficulty understanding how others feel. Seldom do they want clinical treatment. Judging from the (otherwise unreliable) entertainment tabloids, narcissistic personality disorder runs rampant in the film and recording industries.

## Antisocial Personality Disorder

Everyone from ruthless executives to con artists to serial killers is a candidate for this category, which afflicts about 3% of the

adult population in the United States, but as many as 70% to 80% of those in prison (Patrick, 2007). As we might guess from gender differences in criminality, men are four times more likely to be diagnosed with antisocial personality disorder than are women (Regier and others, 1988, 1993).

Persons with **antisocial personality disorder** seem to lack conscience or a sense of responsibility to others. Characteristically, their violations of social norms begin early in life: disrupting class, getting into fights, and running away from home. This pattern may progress to acts of cruelty and wanton disregard for others, such as vandalism, the abuse of animals, or setting fires. Other common signs of antisocial personality disorder include chronic lying and stealing.

Even though people with antisocial personalities may frequently find themselves in trouble, they may not feel anxiety, shame, or any other sort of intense negative emotion. Often, in fact, they can "keep cool" in situations that would arouse and upset normal people. Those who show a violent or criminal pattern of antisocial personality disorder, such as committing murders and other serious crimes, are popularly referred to as "psychopaths" or "sociopaths," although these labels are not recognized by the *DSM-5* (Krueger & Markon, 2006; Miller, 2008).

While we commonly find antisocial personalities among convicted criminals, they are also well represented among successful politicians and businesspeople who put career, money, and power above everything and everyone (Babiak & Hare, 2006; Patrick, 2007). Some can be quite charming, having learned to use their charm to exploit people's tendency to be trusting. These same characteristics can also help them avoid getting caught for long periods of time—and when they do get caught, they are often able to manipulate their way out of trouble.

What causes antisocial personality disorder? Neuroimaging studies have recently suggested a malfunction in the amygdala and in a region of cortex just above the eyes (Kiehl & Buckholtz, 2010; Raine, 2008). We don't yet know, however, whether this is the cause or the effect of the disorder.

## Borderline Personality Disorder

A third form of personality disorder, **borderline personality disorder** manifests itself as instability, impulsivity, and chaotic relationships (Butcher and others, 2010; Selby & Joiner, 2009). People with this diagnosis have unpredictable moods and stormy interpersonal relationships, often becoming upset and abusive in response to perceived slights. They also have little tolerance for frustration. Their impulsivity may be seen in a tendency for substance abuse, gambling, sexual promiscuity, binge eating, reckless driving, self-mutilation, or suicide attempts. Imaging studies even show this volatility in the brain (Bower, 2009; Meyer-Lindenberg, 2008).

---

**WATCH** Borderline Personality Disorder



A woman diagnosed with borderline personality disorder describes her symptoms, which involve a pattern of poor relationships, impulsive behavior, and emotional instability.

One of these people probably lurks somewhere among your acquaintances. Indeed, borderline personality disorder accounts for about 2% of adults and between 10% and 20% of patients in clinical treatment (Meyer-Lindenberg, 2009; National Institute of Mental Health, 2010b). Unfortunately, as with the other personality disorders, the treatment outlook for borderline personality disorder is guarded; they rarely seek or sustain treatment.

# Critical Thinking Applied: The Person–Situation Controversy

Cognitive theorist Walter Mischel dropped a scientific bombshell on personality theorists when he came forth with evidence suggesting that we behave far less consistently from one situation to another than most had assumed (1968, 1973, 2003). A person who is extraverted at a party can become shy and retiring in class; your "neurotic" friend may become a pillar of strength in a crisis. Like Rosalind in Shakespeare's *As You Like It*, one person can present different personalities in different situations and to different people. So, Mischel argued, knowledge of the *situation* is more important in predicting behavior than knowing a person's traits. The ensuing tumult within the field has become known as the **person–situation controversy** (Pervin, 1985).

Mischel's argument challenged the very foundations of most personality theories. After all, if people do act inconsistently in different situations, then what good is a theory of personality? Is there no continuity in personality? Critics mounted withering attacks on Mischel's thesis, pointing out that his methods underestimated a thread of consistency across situations (Epstein, 1980). Bem and Allen (1974) have also pointed out that some people behave more consistently than others. Moreover, people are most consistent when others are watching (Kenrick & Stringfield, 1980) and when in familiar situations (Funder, 1983a, 1983b; Funder & Ozer, 1983).

While the foundations of personality psychology were shuddering, the person–situation controversy gave a boost to social psychology, where psychologists had always argued the *power of the situation*, demonstrating that certain situations can turn normal college students into liars, lovers, or even cruel tormentors. But where does all this leave us in dealing with the person–situation controversy?

## What Are the Critical Issues?

This is *not* an either-or dispute: It's not a question of whether traits *or* situations control behavior. Rather, it is a question of which has more influence and when it does. All sides of the person–situation debate agree that both the person and the situation have an effect. It's the degree of weighting of the person and the situation that is at issue.

There is a second issue, too. How much does the power of personality traits vary from one situation to another? At the extreme, for a prisoner in solitary confinement, the situation obviously has overwhelming importance. But the more important focus is on ordinary people in their everyday lives: How much power does the situation have vis-à-vis traits? It's not an easy question to answer.

## *People Are Inconsistent*

If we look at the same person over time, we may find him or her reacting very differently to the same situation on different occasions. Consider: Do you *always* order the same thing when you go to your favorite restaurant? Or are you *always* cheerful with your friends? Trait psychologists remind us to think of personality traits as a sort of average of how the person customarily behaves. (Perhaps you are *usually* cheerful—on the average.)

What happens when researchers monitor people as they move from one situation to another—are their behaviors pretty consistent, or do they vary widely? One study had volunteers carry small tablets and, several times a day, record their situation, their behavior, and their self-assessment on the **Big Five traits**. The discovery: People's self-described personality traits change as radically as their behavior when they move from one situation to another (Fleeson, 2004).

The lesson to be learned here is that the majority of factors affecting behavior simply cannot be assigned to the person *or* the situation. Behavior seems to result from an *interaction* of trait and situational variables (Kenrick & Funder, 1988). In fact, Mischel has never suggested that we abandon theories of personality. Rather, he sees behavior as a function of the situation, the individual's *interpretation* of the situation, and the personality (Mischel, 1990, 2003; Mischel & Shoda, 1995).

## *It Also Depends on* **What Kind of** *Situation*

It also makes a difference if the situation is familiar or novel. If familiar, then one's habitual ways of dealing with it are likely to be elicited and thus our knowledge of the person's personality will allow reasonably accurate predictions. However, in novel situations where old habits are not appropriate, individuals tend to look to others to define what is the appropriate way to behave, and situational forces submerge personality differences.

## What Conclusions Can We Draw?

Which side of the person–situation debate is right? Both are. The difficulty was that they were right about different things. According to personality psychologist William Fleeson (2004), traits help us understand behavior over long periods of time, when a thread of consistency can be seen in personality—as an individual's behavior converges on a personal average. Over shorter intervals, and especially in particular situations, a person's behavior can be highly variable, as we have seen. So, taking a long view, the trait perspective is right, while on a moment-to-moment basis, the situation perspective wins.

But which side gets the most weight also depends on whether the situation is strong or weak, as Mischel has said. And to further complicate matters, we have to figure

culture into the equation as part of the situation: Evidence has emerged that an individual's personality traits have more influence on behavior in individualistic cultures than in collectivistic cultures (Church and others, 2006). That makes sense, of course, when we think that an individualistic culture places high values on certain traits such as intelligence (as opposed to hard work). And it also makes sense in light of the finding that people in collectivist cultures are less susceptible to the fundamental attribution error—because they emphasize the power of the situation.

PARTING THOUGHTS: *Uniqueness in and Around YOU*

We close this chapter with a question to you.

Do you know what three things in the entire known universe are totally unique?

That means they have features that are both observable and measurable to reveal their distinctiveness that are not shared in any way by another of their kind.

In the human universe they are fingerprints. In the physical universe they are snowflakes. And, we suggest to you, that in the psychological universe they are human personalities. Let's examine this notion a bit further.

The snowflake uniqueness is a discovery by scientists who have photographed millions of freshly fallen snowflakes and found none that had comparable crystal patterns. Snowflakes come in a variety of sizes and shapes. Complex shapes emerge as the flake moves through differing temperature and humidity regimes, such that individual snowflakes are nearly unique in structure. (In 1988, researcher Nancy Knight was documenting snowflakes for the National Center for Atmospheric Research and found two identical snowflakes of the hollow column type, thus challenging the notion that no two are alike. Your authors, though, note that is just two of many millions, so we still think snowflakes are pretty unique!)

The fingerprint uniqueness in an old story. In 1888, the brilliant Francis Galton said this of fingerprints:

*Out of the 4000 cubic inches or so of flesh, fat, and bone of a single human body, there are many that are visible with or without the aid of a lens. Perhaps the most beautiful and characteristic of all superficial marks are the small furrows with the intervening ridges and their pores that are disposed in a singularly complex yet even order on the under surfaces of the hands and feet.* (Nature, June 28, 1888).

The FBI and other law enforcement agencies agree: After collecting and inspecting millions of fingerprints, no two have been found to have identical patterns, not on any one person's hands, nor across the prints of identical twins.

As we have seen throughout this chapter, the psychological study of human personality attempts to discover the unique features in each person's internal makeup. What are the differences between individuals that set them apart from all or most other people? Personality psychologists search for those differences not in external appearances but rather in internal experiences: the inner dispositions, traits, or features of character that combine to make each of us *a singular Person*—unlike anyone else.

You are probably saying to yourself that this approach is quite different from the rest of psychology we have been studying, which attempts to discover general patterns of behavior that are comparable across people in the same situation. And you are right—to a degree. In the quest to understand human personality, researchers develop ways of measuring common traits or similar behavioral patterns that are characteristic of people around the world. This creates a paradox insofar as we each believe in our basic uniqueness. The discovery of what is common and what is unique among people is the endlessly challenging quest of psychologists whose primary focus is on the Individual, the whole person, and the human self in action.

# Summary: Personality

## Chapter Problem

What influences were at work to produce the unique behavioral patterns, high achievement motivation, consistency over time and place, and hardiness to cope with stresses that we see in the personality of Mary Calkins?

- Psychologists recognize the uniqueness of human personalities, yet seek to discover the common patterns between people in their traits, characters, and dispositional features based on genetic, biological, experiential, social, and cultural contributions.

- Psychodynamic theories, particularly Freud's theory, would emphasize early experiences—especially traumas—as well as relations among siblings and with parents. Horney and Jung would have focused on the societal pressures faced by women.

- Trait and temperament theories would look for enduring personality characteristics, such as openness, conscientiousness, and introversion. A major contribution in this domain of psychology has been the quantification of features of personality using a variety of assessment techniques to reveal individual differences in personality.

- Humanistic psychologists, such as Maslow, would focus on a person's goals, strengths, self-concept, and social relationships.

- Social-cognitive theorists would be interested in the person's locus of control. They would also assess the individual's interpretation of important experiences in life.

- Existential theorists would highlight what people can do in the present in order to fulfill future goals.

## What Forces Shape Our Personalities?

### Core Concept 10.1

**Personality is shaped by the combined forces of biological, situational, and mental processes—all embedded in a sociocultural and developmental context.**

We can think of **personality** as the "default settings" for our unique pattern of motives, emotions, and perceptions, along with our learned schemas for understanding ourselves and our world. Personality also has deep evolutionary roots, as seen in displacement of aggression. Neuroscience suggests that the biology of personality comprises a collection of brain modules, each adapted to a different purpose.

But personality also involves nurture; that is, learning driven by the environment, as seen in the effect of family position on personality. The person–situation controversy centers on the relative importance of situations (the environment) as compared with internal traits and mental processes.

The chapter makes an important distinction between personality characteristics, or **dispositions**, and **personality processes**. We need both dispositional theories and process theories for a complete understanding of personality.

Cross-cultural psychologists have complicated the problem of personality by suggesting that personality may not be a universal concept and that Western cultures have a bias toward individualism and a unique self. In fact, all cultures have a tendency either to **individualism** or **collectivism**, both of which leave their imprint on personality. In any culture, however, an individual's personality is, in part, a creation of interactions with other people.

One does not need a theory of personality for explaining ordinary behavior. A good theory, however, is helpful for explaining unusual behavior and eccentric people. The most common theories can be grouped as follows: *dispositional theories* (trait and temperament theories) and *process theories* (psychodynamic theories, humanistic theories, and social-cognitive theories).

## What Persistent Patterns, or *Dispositions*, Make Up Our Personalities?

### Core Concept 10.2

**The *dispositional* theories all suggest a small set of personality characteristics, known as temperaments, traits,**
**or types, that provide consistency to the individual's personality over time.**

Temperament, trait, and type theories are descriptive approaches to personality with a long history stretching back to the humor theory of the ancient Greeks. Modern theories speak of types, traits, and temperaments. In this chapter, we group all three under the heading of **dispositional theories**.

*Temperament* refers to innate personality dispositions, which may be tied to factors in the brain and in the genes. Kagan's work has focused on the inhibited versus uninhibited dimension of temperament. It is evident that shyness is shaped both by nature and also by nurture, as well as cultural norms. By contrast with any type views of personality, traits are thought of as multiple dimensions existing, to some degree, in each person's personality. Traits give personality consistency across situations and may be influenced by both heredity and learning. Many psychologists now agree on the Big Five traits, which seem to have validity across cultures. Trait assessment is the basis for many psychological tests: Some assess common traits, such as the Big Five, while others, such as the *MMPI-2*, assess clinical characteristics. Both the trait and temperament theories do a reasonably good job of describing and predicting behavior, but they offer no explanations for the underlying processes.

A new view of personality has emerged from recent research and thinking about the psychology of *time perspective*. Considering differences in time perspectives as time zones with different response styles associated with them has led to uncovering significant relationships to a host of personality traits.

## How Do Mental *Processes* Help Shape Our Personalities?

### Core Concept 10.3

**While each of the *process* theories emphasizes different forces in the development of personality, all portray personality as the result of both internal mental processes and social interactions.**

The **psychodynamic**, **humanistic**, and **social-cognitive theories** all seek to explain the internal processes and social interactions that shape our personalities. Freud's **psychoanalytic theory** states that the personality arises out of **unconscious** desires, conflicts, and memories. None of our thoughts or behaviors happens by accident, according to the principle of **psychic determinism**. Early childhood experiences also have a strong influence on personality, as the child goes through predictable **psychosexual stages** in which conflicts are dealt with unconsciously. Freud believed that the personality consisted of three main structures, the **id** (the reservoir of unconscious

desires), the **ego** (the largely conscious part of the mind), and the **superego** (which contains the conscience and the ego ideal). Part of the ego, involving the **ego defense mechanisms**, operates outside of consciousness. One of these defense mechanisms, projection, is the basis for widely used **projective tests**, including the **Rorschach** and the **TAT**.

Freud's theory has been extremely influential. Still, critics fault Freud's work for being scientifically unsound, a poor basis for prediction, and unfair to women. Modern psychology also suggests that the unconscious mind is less clever and purposeful than Freud believed.

Other psychodynamic theories, such as those proposed by Jung and Horney, also assume that personality is a dynamic process that involves strong and often-conflicting motives and emotions. Each of these **neo-Freudians**, however, emphasizes different aspects of personality. Jung proposed a **collective unconscious** populated by **archetypes**. He also proposed that people fall into certain personality types, characterized especially by tendencies to **introversion** and **extraversion**. Horney, on the other hand, emphasized conscious processes, **basic anxiety**, **neurotic needs**, and feminist issues in personality theory. Some other neo-Freudians, such as Erikson, also emphasized consciousness as well as life-long personality development.

The humanistic theories, such as those of Maslow and Rogers, argue that people are naturally driven toward **self-actualization**, but this tendency can be suppressed by unhealthy conditions and perceptions. Maslow proposed a hierarchy of needs, suggesting that when the deficiency needs are met, a person is more likely to pursue self-actualization. Rogers taught that the fully functioning person has a positive self-concept that is congruent with reality, while mental disorder arises from incongruence. High self-esteem is more likely when a child comes from a family that provides unconditional positive regard.

The existential theories, such as those of Frankl and Maddi, focus on what people can think and what they can do best now in their current existence in order to satisfy future goals and ambitions. In that process, one finds meaning in existence and hope out of despair.

New research has highlighted *positivity* as a core process in personality that links much research on self-esteem, well-being, and future quality of life across many divergent cultural settings.

The humanistic theories have had considerable impact on psychotherapy, but they have been criticized for being "self"-centered and lacking a strong scientific base. The social-cognitive theories, by contrast, do have a scientific basis, although they are much more limited in scope than are the psychodynamic and humanistic theories. Bandura's social-cognitive theory suggests that personality is shaped by **observational learning**. This occurs in an interaction of cognition, behavior, and the environment known as **reciprocal determinism**. According to Rotter's theory of **locus-of-control**, those with an internal locus are more likely to feel they can control events in their lives than those who have an external locus of control.

Modern theories of personality, unlike those of Freud, Jung, Horney, and the other psychodynamic theorists, have not attempted to provide comprehensive explanations for all aspects of personality. In **family systems theory**, for example, emphasis has turned to the individual acting in a social environment. Other emphases include cultural influences on personality as well as an awareness of gender differences.

Type theory is exemplified in the widely used *MBTI* based on Jung's personality typology. Research suggests that people's characteristics, as measured by the *MBTI* or other personality tests, do not fall into neat type categories but are more accurately conceived of on trait dimensions. Earlier criticisms of the validity and reliability of the MBTI are being handled with new supporting evidence of its utility in classifying workers in organizational settings.

## What "Theories" Do People Use to Understand Themselves and Others?

> **Core Concept 10.4**
>
> **Our understanding of ourselves and others is based on implicit theories of personality and our own self-narratives—both of which are influenced by culture.**

People everywhere deal with each other on the basis of their **implicit personality theories**, which simplify the task of understanding others. Implicit theories often use the same traits that the five-factor theory does, although some gender biases have been reported. Implicit theories also may rely on naïve assumptions, and they often differ on whether personality is fixed or changeable.

Moreover, cross-cultural psychologists have found that the assumptions people make about personality and behavior vary widely across cultures—depending especially on whether the culture emphasizes individualism or collectivism. Those in individualistic cultures are more prone to the **fundamental attribution error**. There are many other dimensions impinging on personality on which cultures differ, including social status, romantic love, expression of feelings, locus of control, and thinking versus feeling.

## Critical Thinking Applied: The Person–Situation Controversy

This ongoing controversy between personality psychologists and social psychologists focuses on the relative significance of what the person brings into a given behavioral

setting, and what the situation brings out of that person when trying to understand any human action. As with the nature versus nurture controversy, both play important roles when they interact in shaping behavioral outcomes.

## Additional Video Resources

Here are five video resources we think you will find both interesting and of personal value to understanding aspects of your own personality and your response style to different situations.

**WATCH** Personality Traits in the Leadership Style of George W. Bush

Personality psychologist Dan McAdams explains how two of the Big Five traits illuminate the leadership style of former President George W. Bush. Watch this video from about 13:15 to 18:50 for interesting application of the Big Five to George W. Bush at: https://www.youtube.com/watch?v=VEv2D6PTwsA.

**WATCH** The Secret Powers of Time

In this engaging animation, renowned psychologist Philip Zimbardo explains how our individual perspectives of time affect our work, health, and well-being. View the video at: https://www.youtube.com/watch?v=A3oIiH7BLmg

**WATCH** Encountering Abraham Maslow

This short documentary reviews the life and contributions of humanistic psychologist Abraham Maslow and includes original footage of Maslow speaking. Watch the video here: https://www.youtube.com/watch?v=9FEwsKcPsKs

**WATCH** Inside the Psychologist's Studio with Albert Bandura

This interview with Albert Bandura includes some fascinating insights about his social cognitive theory, as well as personal stories of key moments in the life of this legendary psychologist. You can view the video here: https://www.youtube.com/watch?v=-_U-pSZwHy8

**WATCH** The Growth Mindset: Believing You Can Improve

Stanford psychologist Carol Dweck explains the powerful differences between people with fixed versus growth mindsets and suggests ways to help children develop a growth mindset. Watch the video here: https://www.ted.com/talks/carol_dweck_the_power_of_believing_that_you_can_improve?language=en

# Chapter 11
# Social Psychology



In Milgram's obedience research, adult male "teachers" were instructed to deliver increasingly painful shocks to their "student" at the command of the authority figure, allegedly to help improve his task memory.

## ∨ Core Concepts

**11.1** We usually adapt our behavior to the demands of the social situation, and in new or ambiguous situations, we take our cues from the behavior of others in that setting.

**11.2** The judgments we make about others depend not only on their behavior but also on our interpretation of their actions within a social context.

**11.3** Systems shape situations, which in turn affect behavior—and by understanding social systems, we can learn how to change them for the better, and modify their negative influences on us.

While reading the Sunday newspaper, Bill notices that a prestigious university in his town is recruiting male adults, ages 20 to 50, to participate in a psychological study designed to help people improve their memory. He decides to volunteer for what seems like an interesting and worthwhile experiment, for which he will also get paid a small fee. On his arrival at the university's laboratory, Bill is greeted by the researcher and introduced to a second applicant named Douglas. The Experimenter, impressive in his pristine medical laboratory coat, explains that the research study will test a new method of improving people's learning and memory—by punishing them for their errors. "We know that

positive reinforcement for correct responding is a key to developing animal and human memory. We now want to test whether punishing someone for incorrect responses will have a similar effect," he says. The two men draw straws to determine who plays each role of Teacher and Learner; it does not seem to matter which man plays which role.

The task is straightforward: Bill will play the role of the "Teacher" and give Douglas, the "Learner," a set of word pairings to memorize in a given time period. Every time that the Learner provides the correct answer, the Teacher gives him a verbal reward, "Good" or "That's right." When wrong, the Teacher is to press a lever on the impressive-looking shock apparatus that delivers an immediate shock to punish the Learner.

The shock generator has 30 switches, starting from a low level of only 15 volts and increasing in intensity in 15-volt steps all the way up to 450 volts. The control panel indicates both the voltage level of each of the switches and a corresponding description of that level. For instance, the 25th level (375 volts) is labeled "Danger, Severe Shock," and at the 29th and 30th levels (435 and 450 volts), the control panel is simply marked with an ominous "XXX." The experimenter goes on to note that every time the Learner makes a mistake, the Teacher must press the next higher-level voltage switch.

The Learner, Douglas, is escorted into an adjacent room, where his arms are strapped down and an electrode is attached to his wrist. The shock generator in the next room will deliver the shocks to the Learner's wrist—if and when he makes any errors. Douglas mentions that he has a slight heart condition and hopes the shocks will not hurt him much. The Experimenter reassures him not to worry, that the shocks may become strong but will not cause any permanent damage. Bill administers the test material and communicates over the intercom to Douglas, while the Experimenter stands near him.

Initially, Douglas performs well, getting rewarding praise from Bill. Soon, however, he starts making errors, for which Bill immediately starts pressing those shock switches. As Douglas messes up more and more, the shock levels increase, and he complains that the shocks are starting to hurt. At 75 volts, he moans and groans; at 150 volts, the 10th level, Douglas has had enough and demands to be released from the experiment. Bill looks anxiously at the Experimenter, who nods that he must continue. As the shock levels increase in intensity, so do Douglas's screams, as well as his reminder that he has a heart condition. Bill is now really distressed: "Sir, who will be responsible if anything happens to that man?" The Experimenter dismisses his concern about personal responsibility by declaring, "I will be fully responsible, now continue your task, Teacher." More trials, more shocks, more screams from the next room. Bill hesitates, questioning whether he should go on, but the Experimenter insists that he has no choice but to do so.

At 300 volts, Douglas demands to be freed and complains loudly about his heart condition. Bill has had enough. He verbally dissents—"I can't continue to hurt him, sir, I refuse to go on." The Experimenter calmly insists that Bill must continue because he has a contract to complete the experimental procedure.

Reluctantly, Bill continues to punish Douglas for his errors until he reaches the level of 330 volts. Bill hears a scream, a thud, and then silence from the shock chamber. "He is not responding; someone should go in there to see if he is all right." But the Experimenter remains impassive, telling Bill, "If the Learner doesn't answer in a reasonable time, consider it wrong because errors of omission (failing to respond) must be punished in the same way as errors of commission—that is The Rule you must obey."

As Bill continues to give the next shock level, there is no response from his pupil, Douglas. Bill complains more loudly that it doesn't make sense for him to continue under circumstances, but, nothing he says sways the Experimenter to allow him to exit from this unexpectedly distressing situation. Instead, he is told to simply follow the rules because Bill's job as Teacher is to keep posing the test items and shocking the Learner's errors—even if it means going all the way up the scale to the full and final 450 volts. Bill keeps complaining, but also keeps pressing higher and higher shock level switches—all the way up to the full final level!

How do you think *you* would act if you were in Bill's seat as the Teacher in this social memory experiment? At what shock level would you absolutely refuse to continue? Most of us believe that we would have verbally dissented, then disobeyed behaviorally, and just walked out. You would never sell out your morality for few dollars, would you? Who would violate their conscience to blindly obey the commands of an authority to harm an innocent person? Maybe only a psychopath would. That is what many psychiatrists believed, who when predicting the outcome of this study were sure that only 1% of American citizens would go all the way up to the maximum shock level—the percentage of psychopaths in our nation. They could not have been more wrong!

This experiment was actually conducted by a young social psychologist named Stanley Milgram back in 1963 at Yale University in New Haven, Connecticut, where he was a new assistant professor. He tested more than 500 ordinary citizens from all walks of life (none were students) and discovered that two of every three Teachers (65%) went all the way up to the maximum shock level of 450 volts. Most protested along the way, but the *majority* obeyed the authority figure to deliver what they believed might be lethal levels of shock. (We should add that the Learner was actually a research confederate, trained to act like another middle-aged participant. He did not get shocked, but the teacher-subject believed he was.) You will read more about Milgram's experiment later in this

chapter, but for now let's examine what this experiment tells us about human nature. Also we will understand better the nature of the prediction error made by those 40 psychiatrists.

> **CHAPTER PROBLEM: What makes ordinary people willing to harm other people, as they did in Milgram's shocking experiment?**

It is equally important to realize that although the majority obeyed fully, there was a minority who did refuse to give into this unjust authority. In most situations of powerful authority rule, in experiments and real life, the majority conform, comply, obey. However, there is always a minority from 10% to 30% who resist and rebel. We then want to consider what makes some people go against the flow to help others, come to the aid of the distressed, volunteer their time and services, and even act heroically?

# What Makes Social Psychology Special?

Welcome to **social psychology**, the field that investigates how individuals affect each other. It may be a relief to hear that not all of social psychology brings such bad news about ourselves as does this experiment on obedience to authority. This exciting field of social psychology also explores the forces that bring people together for friendships and loving relationships, as well as for cooperation and conflict resolution. As you study social psychology in this chapter, you will learn how people's thoughts, feelings, perceptions, motives, and behavior are influenced by their interactions with other people. In a nutshell, you'll find three core themes (see Figure 11.1).

Social psychologists try to understand behavior within its social context. Defined broadly, the **social context** includes the real, imagined, or symbolic presence of other people; the activities and interactions that take place among people; the settings in which behavior occurs; and the expectations and social norms governing behavior in a given setting (Sherif, 1981). Social psychologists are curious to discover the interrelationships between the person and the situation, how individual personality and character may affect behavior in social settings, and also how they are in turn influenced by factors in the social situation. Simply put, what do individuals bring into any situation, and what does a given situation bring out of those people? Of course, such a focus includes investigating group behavior, such as teamwork and conformity, as well as group prejudice and terrorism. Social psychologists believe that by understanding the processes and mechanisms that give rise to negative social behaviors, positive interventions can be developed to prevent or transform such actions.

**Figure 11.1** The Three Themes of Social Psychology

Social influences on our behavior come from external situations, internal mental processes, and broad social systems we live in.



Most of all, the obedience research, as in Milgram's shock study, underscores the power of social situations to influence our behavior. This is a major theme to emerge from social psychological research over the past 50 years.

Yet as powerful as any situation can be, psychologists know that it is not only objective reality to which we respond. It is not just the physical size and shape and color of a room that might affect how we act when in it; rather, we respond to our subjective interpretation of the situation—to our personal perception—of what it means to us. Thus, the same physical setting can differ significantly from person to person, and it can change over time as we experience it differently. This, then, is the second important theme in social psychology: the personal construction of a subjective social reality. We must grasp this world of expectations and perceptions to understand the attractive forces at work in building friendships and romantic relationships as well as the repulsive forces underlying violence, prejudice, and discrimination.

The third important theme in social psychology explores who or what creates various situations and maintains them, such as prisons, gangs, cults, and torture centers, but also positive settings, like your college, volunteer organizations, summer camps, online dating apps, and many other settings that have an impact on human behavior. Initially, we will focus on research that highlights the ways that *situations* matter in influencing how we think, feel, and act. Next, we expand our perspective to highlight the ways that *systems* matter in creating, maintaining, and justifying various life situations, for better or for worse. A classroom where bullying is taking

place would be a *situation,* a behavioral context, whereas the *system* would be the school administration and its policies and procedures. We will also see how social psychologists have experimented with altering the situation to change subjective social reality that, in turn, helps to promote the human condition. That is a lofty goal of many social psychologists who are hard at work to help realize it in many domains. Ideally, the applied goal of social psychological research is to use the knowledge gained to improve the human condition.

# Key Question: How Is Our Behavior Affected by the Social Situation?

### Core Concept 11.1

**We usually adapt our behavior to the demands of the social situation, and in new or ambiguous situations, we take our cues from the behavior of others in that setting.**

Imagine you find yourself in an interview for a great summer job, with the possibility of being hired as an intern at Google. During the interview, the interviewer tries to break the ice by telling an off-color sexual joke that you personally find a bit offensive.

Do you let him know what you are feeling, or do you laugh? Afterward, he suggests that you go to lunch together in the company cafeteria.

- At lunch, do you start the conversation or wait for him to direct it?
- Do you gulp down your favorite dessert before the soup that is less appealing to you?
- After you cut the meat, will you shift your fork from your left hand to your right hand as you put the food you cut into your mouth, or do you always keep the fork in your left hand?

Even in this simple social situation, there are many social and cultural rules governing what is appropriate and acceptable behavior. If you are like most people in an unfamiliar situation such as this, you will take your cues of what is the "right" thing to do from those around you. The interviewer essentially sets the table for the conversation, and you follow suit, as well as pretending to like his off-color joke. You want the job and therefore are more compliant than you might be otherwise. Europeans do not switch hands, as Americans do, when eating, a habit learned unconsciously in family settings by observing others, rarely by being told to do so. Desserts, however desirable, come last in the eating sequence—it is scripted behavior, meaning

we act predictably in particular behavioral sequences in given situations, like that of a standard restaurant or home meal script.

The power of situations to dominate our personalities and override our history of learning, values, and beliefs is greatest when we are enmeshed in new settings. The more novel the situation, the less we rely on our habitual ways of responding. Instead, we look to others to define for us how to behave so that others will find us acceptable and appropriate. But what is acceptable in your first visit to a church service or a funeral will be quite different from your first experience with fraternity hazing or at a rock concert. We will see that the pressures of these social situations can have powerful psychological effects, getting us to do things we might never do ordinarily—even immoral, unethical, and illegal actions.

Those pressures were operating on Bill when he was acting the role of "Teacher" in Milgram's obedience experiment, leading him to deliver extremely painful shocks to an innocent, likeable "Learner." Social roles, situational rules, how we are dressed, whether we are anonymous or highly visible, if we are in a competition, or the mere presence of others can all profoundly influence how we behave. Often, these subtle situational variables affect us in many ways even without our awareness. They may even guide our actions in mindless or stupid ways. Our core concept emphasizes this point:

We usually adapt our behavior to the demands of the social situation, and in new or ambiguous situations, we take our cues from the behavior of others in that setting.

In this section, we will explore the concept called **situationism** and the research that supports it. Situationism assumes that the external environment, or the social one, can have both subtle and forceful effects on people's thoughts, feelings, and behaviors. Situationism is contrasted with **dispositionism**, the tendency to attribute behavior to internal factors such as genes, personality traits, and character qualities. Dispositionism looks within the individual actor for explanations of why someone acted in a particular way, whereas situationism looks to the external environment. Let's look more closely at the **power of the situation** to create mischief under the headings of conformity, obedience, mindless groupthink, and the failure to help others in distress.

By the end of this section, you will be able to:

**11.1** Review some of the social determinants of behavior

**11.2** Evaluate the factors influencing conformity and non-conformity

**11.3** Explain the power of obedience to authority in various circumstances

**11.4** Use Milgram's research findings to influence people to engage in compassionate acts

**11.5** Analyze the bystander intervention problem

# 11.1: Social Standards of Behavior

**Objective:** Review some of the social determinants of behavior

A job interview, such as the one described earlier for a job at Google, provides an example of situational influences on your behavior as you try to do "what is right" in front of your prospective employer, sometimes doing anything to get that prized job. You will also notice the power of the situation when you compare the way students talk to their friends versus their professors or how you act at family dinners versus watching favorite TV programs with your pals. Most people learn to size up their social circumstances and conform their behavior to situational demands. The responses most people make depend heavily on two factors: the *social roles* they play and *social norms* of the group. Let us look at both of these closely.

## 11.1.1: Social Roles and Social Norms

How do you go about answering the basic question: Who are you? One answer might be: I am a college student, work part time, religious, a cyclist, techie, honor student, and good looking. Each of those descriptors becomes a **social role** you play in your personal life drama. People from another culture that is more focused on collective values (than ours is on individual values) might answer the "Who am I?" question with: I am a sister, a part of family *X*, a member of tribe *Y*. A social role is one of several socially defined patterns of behavior that are expected of persons in a given setting or group. The roles you assume may result from your interests, abilities, and goals—or they may be imposed on you by the group or by cultural, economic, or biological conditions beyond your control. In any case, social roles prescribe your behavior by making obvious what you should do, how you should do it, when, where, and why? Occupations are filled with many roles, such as receptionist, union organizer, manager, claims agent, technician, and more.

The *situations* in which you live and function also determine the roles that are available to you and the behaviors others expect of you. Being a college student, for example, is a social role that carries certain implicit assumptions about attending classes, studying, and handing in papers before deadlines. It also implies a certain

degree of privilege, of usually not having to work full time, and of being interested in improving how your mind works and having the luxury of time to explore your career options. In addition, the adoption of this role makes other roles less likely. Thus, your role as college student diminishes the chances that you will later assume the role of terrorist, gang leader, or truck driver, for example. But more mature students might already head their own family, hold full-time jobs, be returning veterans, or be social-political activists.

In addition to specific social roles that individuals enact, groups develop many "unwritten rules" for the ways that all members should, or ought, to act. Gangs may demand unquestioned obedience to their leader and a willingness to fight or kill anyone designated as the "enemy." Modern-day male executives in technology businesses typically wear jeans to work and rarely wear ties; this would be the wrong attire in other business settings, such as a law practice. Female Muslim students may wear veils to class (as a religious statement) and must do so in some cultures. Italians greet each other by kissing on the cheek in a fixed order, right then left, and in Poland, they add a third kiss for good measure. These expectations, called **social norms**, dictate socially appropriate attitudes and behaviors in particular behavioral settings. Social norms can be broad guidelines, such as ideas about which political or religious attitudes are considered acceptable. Social norms can also be quite specific, embodying standards of conduct such as being quiet in the library or shining your shoes for a job interview. Norms can even guide conversation, as when they restrict discussion of sensitive or taboo subjects in the presence of certain company, like the opposite sex, or those with known political differences.

**LEARNING AND ADJUSTING TO SOCIAL NORMS**
Some norms exist in unwritten rules that are built into various situations—for example, when teachers are lecturing, students are expected to listen and not talk simultaneously. However, what about the norms governing your behavior in elevators? We bet you always face the front of the elevator and either stop talking to a friend or talk lower when others are there as well. Why? Where are those rules written? How did you learn them? What would happen if the next time you enter an elevator filled with other people, you faced the rear? Try that little experiment and see how others react. (It is a classic demonstration first shown on TV's *Candid Camera* program in the 1960s—Face the Rear.) Or try sitting down when everyone stands up for the national anthem. To know if a social norm is operating, just try to violate it and check out the reactions of others in that same setting. If they express distress of some kind, you know you just broke a norm. (Then be ready for a flack attack of some kind.)

**Figure 11.2** Social Norms Change Over Time



When a person joins a new group, such as a work group or a group of friends, there is always an adjustment period during which the individual tries to discover how best to fit in. Adjustment to a group typically involves discovering its social norms. Individuals experience this adjustment in two ways: by first noticing the uniformities and regularities in certain behaviors, and then by observing the negative consequences when someone violates a social norm.

For example, a new student in your school who carries books and notes in an attaché case will be seen as "out of it" if backpacks are in, and vice versa in other schools. The same is true of dress codes, which are rarely explicit but can guide how almost everyone dresses (See Figure 11.2). Guys wearing baseball caps sideways would have been laughed at a generation earlier, before they were "in." Also, women wearing shredded jeans would have been thought of as too poor to buy new ones. The same is now true with athletes wearing diamond earrings or flashy extensive body tattoos. Also, elaborate handshake rituals among some guys have replaced the "old-fashioned" simple hand-in-hand shake.

**WRITING PROMPT**

**Violating Social Norms**

Think of a time when you became aware of violating a social norm in a given setting. How did you violate it, knowingly or unaware? What was the reaction of others and your feelings?

> ▶  The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

## 11.1.2: Schemas and Scripts

To help us organize all this information to better guide our actions, we form **schemas**. Once a schema is formed, it enables us to make predictions about what to expect in various settings. So, it is often upsetting when one of our schemas is violated and fails to predict the expected. Imagine going into a (non–fast food) restaurant, ordering your meal, and getting the bill before any food appears. Imagine that the waitperson brings the dessert first, then the main

course, then the appetizer. Violation of expectation! Schemas become "shoulds" about how people ought to behave in certain settings; when they do not, this provokes negative reactions, because we assume that person must be sharing our schema. The restaurant example involved a violation of an event schema.

A **script** involves a person's knowledge about the *sequence* of events and behavioral actions that is expected of a particular social role in a given setting. It is our expectations about a process of events that ought to occur in a standard, predictable order.

## 11.1.3: Social Norms Influence Students' Political Views

We know that parents influence their children's politics, but can the political views of faculty influence those of their students? Social psychologist Theodore Newcomb posed this question.

1. The college: Vermont's Bennington College
2. The time: the 1930s—the era of the controversial President Franklin D. Roosevelt
3. The students: women from wealthy, conservative homes with decidedly conservative values
4. The faculty: young, dynamic, and liberal

Bennington's campus culture, then, had a prevailing norm of Roosevelt's political and economic liberalism. The researcher wondered: Which of these two opposing forces—their families, or the faculty—most shape the attitudes of these students? (What would you predict?) Clearly any prediction would pit immediate situational forces (faculty) against longer term but remote forces (family). Surprisingly, perhaps, his data revealed that the immediately present norms of the campus won the war of influence against the remote norms of the family. In most women, their initial attitude of conservatism was transformed as they progressed through their college years, so that by their senior year, they had clearly converted to liberal thinking and causes (Newcomb, 1943). But was that shift in attitudes enduring?

It was indeed. Women who graduated as liberals remained liberals; the minority who had resisted the prevailing liberal norm remained conservative. This was accomplished in part by each of them marrying their "own kind" politically. Most of the women married husbands with values similar to their own—either liberal or conservative—and created supportive new home environments that sustained those different ideologies. The liberal Bennington allegiance was still evident some 30 years later in the 1960 presidential election, when 60% of the class Newcomb had investigated voted for liberal Democrat John Kennedy rather than conservative Republican Richard Nixon—in contrast to less than 30% support for Kennedy among graduates of comparable colleges at that time (Newcomb and others, 1967).

**Table 11.1** Political Values of American College Students

In most cases, the data show that students in the 21st century—just like those in the 1930s at Bennington College—become more progressive in their political values as they go through the college experience.

| Students' characterization of their political views | At college entry (TFS) | At end of college (CSS) | Change* |
|---|---|---|---|
| Liberal or Far Left | 29.7 | 39.1 | 9.4 |
| Middle-of-the-road | 41.6 | 38.5 | –3.1 |
| Conservative or Far Right | 28.7 | 22.5 | –6.2 |
| Percent of students reporting that they agree strongly or agree somewhat that: | At college entry (TFS) | At end of college (CSS) | Change* |
| Marijuana should be legalized | 29.6 | 44.0 | 14.4 |
| Same-sex couples should have the right to legal marital status | 56.5 | 69.3 | 12.8 |
| Abortion should be legal | 48.6 | 60.5 | 11.9 |
| The death penalty should be abolished | 40.4 | 46.5 | 5.8 |
| Colleges have the right to ban extreme speakers from campus | 44.3 | 49.1 | 4.8 |
| Realistically, an individual can do little to bring about changes in our society | 20.6 | 22.2 | 1.6 |
| Affirmative action in college admissions should be abolished | 53.7 | 51.7 | –2.0 |
| Racial discrimination is no longer a major problem in America | 19.8 | 14.3 | –5.5 |
| Colleges should prohibit racist and sexist speech on campus | 63.1 | 54.9 | –8.2 |
| It is important to have laws prohibiting homosexual relationships | 28.4 | 18.0 | –10.4 |
| There is too much concern in the courts for the rights of criminals | 55.0 | 42.8 | –12.2 |
| Federal military spending should be increased | 32.7 | 20.5 | –12.2 |

*Note: These figures are compiled only from cases with TFS and CSS data (N = 12,205)

And what of students today? As the chart in Table 11.1 shows, the trend originally found at Bennington College continues. As a group, students become more liberal in their attitudes as they go through college. Not all, of course—but most do. Conservative pundits often blame this trend on indoctrination by liberal-leaning professors, but the data show that students are far more influenced by the views of their peers than they are by the faculty.

Campus culture is not the only source of norms and group pressure, of course. One's workplace, neighborhood, religious group, and family all communicate standards for behavior—and threaten sanctions (such as firing, social rejection, or excommunication) for violating those norms. But a high school, college, or university environment can have a powerful impact on young people. This is especially

true if they have had narrow life experiences and had not previously encountered attitudes radically different from their own. For example, new college students commonly adopt classmates' political opinions, as in the Bennington study, and also frequently take on religious beliefs of classmates, as well as attitudes about sex and alcohol (Prentice & Miller, 1993; Schroeder & Prentice, 1995). In residential colleges where most students live in dorms, sharing meals and after-class activities, social norms have an even greater impact on a range of student behaviors than is evident among students in commuter colleges.

# 11.2: Conformity

**Objective:** **Evaluate the factors influencing conformity and non-conformity**

How powerful are these social pressures? We can see the effects of social pressure in people's moods, clothing styles, and leisure activities (Totterdell, 2000; Totterdell and others, 1998). This tendency to mimic other people is called the **chameleon effect**, after the animal that changes its skin color to blend into its varied environments (Chartrand & Bargh, 1999). We saw how social pressure in political attitudes influenced Bennington College students.

- *But can social influence be strong enough to make people follow a group norm that is clearly and objectively wrong?*
- *Could the power of that situation prove stronger than the evidence of your own eyes?*
- *Could a group of strangers get you to see the world through their distorted eyes?*

Imagine the following scene.

## 11.2.1: The Asch Effect: A Minority of One in a Challenging Majority

A receptionist shows the last-arriving participant into a waiting room, where conversation with six other volunteers reveals that they are all there for the same experiment. What the latest arrival does not know is that the other six are really accomplices of the experimenter—often called *confederates* in social psychological research. Together, they have rehearsed an elaborate plan to exert social pressure on the one real participant.

Soon the experimenter enters and invites all seven into another room where they sit in a row of seven chairs facing an easel. On the easel, the group sees a stack of large cards, like the one in Figure 11.3, featuring four vertical lines.

The task is to say which of the lines, A, B, or C, appears to be the same length as Standard line X. Casually, the experimenter starts to collect judgments from the group, beginning at the opposite end of the row from the one real subject. Everyone appears mildly bored at this apparently simple task.

Everything goes smoothly until the third card comes up. On that card (see Figure 11.3), line B is obviously the correct answer—so the one naïve participant cannot believe that the first person says "A." As a psychology student, our naïve volunteer knows that different people perceive the world differently, which makes it easy to attribute this response to an individual perceptual deviation. Then the second person agrees: "A." When the third and the fourth persons also say "A," the naïve volunteer begins to wonder, "Am *I* the one with the loose perceptual screw?" As the next to last to respond, his perception has been placed in conflict with the statements of all five people who have responded before. Squinting at the card again,

---

**Figure 11.3** Conformity in the Asch experiments

Images from Asch's pioneering study. Top right: typical stimulus array. Top left graph shows conformity across 12 trials. Percent correct estimates when unanimous majority gave wrong answer (bottom line) or when participant had support of a dissenting partner (middle line).

he stammers, "Uh . . . 'A.'" The remaining respondent makes that perceptual judgment unanimous.

As the experiment proceeds through the deck of 18 cards, the other participants sometimes give the "right" answer, but they make an apparently incorrect judgment on 12 critical trials. Are they crazy? Shaken, our naïve volunteer goes along with everyone else's "mistakes," rationalizing that it would be inappropriate to spoil the experiment by being the only one who is disagreeing.

**What would *you* do under these circumstances?**

You may think that you would resist the pressure if you really had been in one of Asch's experiments. Perhaps so, but in fact, almost two-thirds of the naïve participants in Asch's original experiment actually withstood the group pressure to conform to the plainly erroneous judgments. But, the important take away message is that fully one-third of all students *did* conform, meaning they went against their own perceptual reality because of the new social reality.

Social psychologists call this the **Asch effect**: the powerful influence that a group exerts on the objective judgments of an individual. And Solomon Asch's experiment has become the classic illustration of **conformity**—the tendency for people to adopt the behavior and opinions presented by other group members. Even though individuals were judging matters of fact, not merely personal opinions, many caved in to conformity pressures.

This result encouraged Asch and others to tinker with the experimental conditions a bit, contriving circumstances under which fully *two*-thirds of his participants yielded to the majority. What are those conditions that Asch and other researchers found to encourage conformity?

- **Unanimity of the majority.** If everyone in the group agrees, they can exert a powerful social pressure. But if even one person defects from the majority, the spell is broken and yielding drops dramatically (Asch, 1940, 1955, 1956).
- **Size of the group.** In a group of only one or two other people, most subjects apparently feel little pressure to conform to the group's erroneous judgments. The pressure suddenly increases when confronting a group of three or more.
- **Making a public commitment rather than a private one.** If you believe others in the group will not hear your responses, you are less likely to go along with them when you think they are incorrect (Deutsch & Gerard, 1955).
- **Ambiguity.** When the lines are nearly the same length—so that the correct answer is not crystal clear—people seem more prone to self-doubt and to yield to group conformity.
- **Self-esteem.** As you might guess, people who place a low value on themselves are more likely to conform in the Asch experiment (Aronson, 2011).
- **Makeup of the majority.** Consistent with the findings on self-esteem, more conformity occurs when

the group has high status (Eagly, 1987) or is otherwise seen by the individual as being important. Incidentally, women are no more likely to conform to the group than are men, unless the task is a stereotypically male-oriented task, such as making judgments about the quality of power tools (Eagly & Carli, 1981).
- **Independents.** Despite powerful pressures to yield, some rare individuals are able to resist and maintain their independence, standing their ground to "call 'em as they see 'em"—even to the point of deliberately giving a wrong answer when the group gives a correct one (Friend and others, 1990).
- **Unanimity broken.** Conformity is greatest when the group majority is unanimous—but once that unanimity is broken, the rate of conformity drops dramatically (Allen & Levine, 1969; Morris & Miller, 1975)
- **Power of an ally.** We want to highlight one finding that can have personal relevance to you: the importance of even one person challenging the group's norm. Even in a large group, giving the person one ally who dissented from the majority opinion sharply reduced conformity (as shown in Figure 11.3). With such a "partner," nearly all subjects resisted the pressures to conform. This is one of the most positive takeaway messages from this research. If you are willing to challenge the group openly, chances are you will influence others to join your rebellion. Even one hero can inspire others not to yield to the group pressure. We call that the "Power of One." The "Power of Two" is when you form an allegiance against the group majority, or you are an ally to someone being bullied or being made an outcast because of their ethnic, racial, or gender status in a given situation.

## 11.2.2: What's It to You?

So now imagine you are about to vote openly in a group, as is common in clubs or on boards of directors. You will probably conform to the group majority if:

(a) The issue being decided is complex or confusing.

(b) Others in the group seem to know what they are talking about.

(c) You must vote by raising your hand instead of casting an anonymous ballot.

(d) The entire group casting their votes before you all vote in a certain way.

(e) *And especially if* the leader votes first.

Being informed about such conformity pressures should make you wiser about how you might go along with the group even when they are heading in a wrong or even immoral direction. Resisting such influence requires critical thinking and being mindful of what you have

learned here and in this psychology course about the power of social forces.

In the Asch effect:

1. People conform because of *normative influences,* wanting to be accepted, approved, liked, and not rejected by others.
2. Another reason for conformity comes from *informational influences,* wanting to be correct and to understand the correct way to act in any given situation.

Conformity research such as this clearly poses ethical problems, when accomplices of the researcher lie to fellow students about their perceptions. But how could you do the basic Asch paradigm without deception? How about if everyone views the lines wearing goggles: the real subject's goggles are clear and show the lines as they are in reality, but the goggles of the majority of students are altered so that they all see the lines the same way as each other, but distorted to make dissimilar size lines look the same as the standard. This technique was used in a study with participants wearing glasses similar to those in 3D movies with polarizing filters (Mori & Arai, 2010). In that study, 104 Japanese students were tested in groups of four: Three wore the distorting glasses and the other wore a different, normal pair of glasses. The result? Asch's conformity effect was obtained without deceptive accomplices. However, there were some differences. The conformity percentage was greater than what Asch originally found, and only female students conformed. A follow-up study (Mori & Arai, 2010) investigating the gender difference indicated that, earlier in life, both boys and girls in Japanese culture conform, but boys become more independent over time while girls remain at stable levels. Additional studies are necessary to determine how far-reaching this pattern may be.

## 11.2.3: Conformity: Good to Go or No?

When is the best to follow the pack by relying on available social information, and when should you go it alone? What do you think?

Even without knowing much about germ theory, most of us follow the rule: wash hands with soap and water before preparing food or after social gatherings. It is also good to follow the strong conformity signal in situations where there are many behavioral options to choose from. Support for this conclusion comes from a recent set of experiments testing students from the University of British Columbia and also the general population on tasks like those in the original Asch line estimation tasks (Muthukrishna and others, in press). One of the most interesting findings linked IQ to anti-conformity. Higher IQ folks tend to take their own solo path and reject conformity pressures more often then those with average IQs. However, when

uncertainty is high, then those who are smarter react strategically by following the majority.

## 11.2.4: Cultural Differences in Conformity

The Asch test has gone to several parts of the world, revealing remarkably similar results from most groups. The proportion of those who yield to group pressure (under Asch's original conditions) hovers around one-third in a wide variety of societies. Table 11.2 shows some typical results of such studies.

**Table 11.2** Cross-Cultural Differences in Conformity in the Asch Situation

| Country | Percentage Yielding on the Asch Test |
|---|---|
| Rhodesia | 51% |
| Fiji | 36% |
| Brazil | 34% |
| United States | 33% |
| Hong Kong | 32% |
| Lebanon | 31% |
| Japan | 25% |
| Germany | 22% |

The consistency of these results hints that the same force is at work across different cultures. Nevertheless, some caution is in order. Participants in most of these investigations were college student volunteers, a fact that may make them different in many ways from other people in their own societies. A few studies have found exceptions to the apparent trend of consistency, and those exceptions pose interesting questions about conformity and culture. For example, among those from the Bantu culture in Rhodesia, 51% conformed on the Asch test. We can easily explain this result because this Bantu culture customarily exacts a heavy penalty for nonconformity to social customs. At the other extreme, German university students yielded to the group only 22% of the time. This very low percentage was unexpected, but it might be attributable to the age of the German sample, which was older than the other groups—but even more likely as an anti-conformity reaction to the lessons learned from earlier Nazi-led German generations.

The most surprising results, however, may be the high level of *non*conformity among Japanese students. The casual observer of Japanese culture is usually struck by the conformity to group norms displayed by the Japanese. Yet in the Asch situation, participants yielded at the remarkably low rate of 25%—significantly less than the reputedly nonconformist Americans. Moreover, the Japanese subjects were especially high in *anti-conformity,* a deliberate rejection of group norms: 34% gave deliberately

*wrong* answers when the rest of the group gave correct responses! A possible explanation is that the Japanese culture of conformity may, in reality, be found only within the group to whom the individual Japanese person feels special allegiance. Thus, when Japanese students were presented with judgments made by a group of strangers, they felt little pressure to conform because it was not *their* own **in-group**.

## 11.2.5: The Autokinetic Effect

An early classic experiment, conducted by Turkish-American psychologist Muzafer Sherif (1935), demonstrated how social influence can lead to internalization of a new norm. Participants were asked to judge the amount of movement of a spot of light that was actually stationary but appeared to move when viewed with no reference points in total darkness. This is a perceptual illusion known as the **autokinetic effect**. Originally, individual judgments varied widely. However, when the participants came together in a group of strangers to state their judgments aloud, their estimates began to converge. They began to see the light move in the same direction and by similar amounts. Even more interesting was the final part of Sherif's study—when alone in the same darkened room after the group viewing, these participants continued to follow the group norm that had emerged when they were together. As in the Asch studies, the group influenced individuals' perceptions.

Moreover, once norms are established in a group, they tend to perpetuate themselves. In later research, these autokinetic group norms persisted even a year later when the former participants were retested alone—without former group members witnessing the judgments (Rohrer and others, 1954). This is a powerful example of **informational social influence**. Norms can also be transmitted from one generation of group members to the next and thus continue to influence people's behavior long after the original group that created the norm no longer exists (Insko and others, 1980). How do we know about this transgenerational influence of group norms? In autokinetic effect studies, researchers replaced one group member with a new one after each set of autokinetic trials until all the members of the group were new to the situation. The group's autokinetic norm remained true to the one handed down to them across several successive generations (Jacobs & Campbell, 1961).

Do you see how this experiment captures the processes that allow real-life norms to be passed down across generations in businesses, neighborhoods, cities, families, or political groups? Such norms come to be part of the culture that dictates how members should see the world in common ways—sometimes for better, as in firms like Apple and Google, but sometimes for worse, as in the corrupted Enron and Arthur Andersen Accounting firms. And, as we have seen, social norms exert powerful influences on our behavior and are difficult to resist. (We recommend viewing the documentary film, *Inside Job*, 2011, to understand some of the social psychological forces that contributed to the financial meltdown in Wall Street and around the world. Another powerful film we recommend is *Enron: The Smartest Guys in Town,* by Oscar award-winning director Alex Gibney*.)*

## 11.2.6: Conformity and Independence Light Up the Brain Differently

New technology, not available in Asch's day, offers intriguing insights into the role of brain processes in social conformity. When people conform, are they rationally deciding to go along with the group out of **normative** needs, or are they actually changing their visual perceptions and accepting the validity of the new, though erroneous, information provided by the group? One study (Berns and others, 2005) used advanced brain-scanning technology to answer this question. It also answers the question of whether the old Asch effect could work with the current generation of more sophisticated students. (A peek ahead says, "Yes.")

Using functional magnetic resonance imaging (fMRI), researchers can now peer into the active brain as a person engages in various tasks and detect which specific brain regions are energized as they carry out each of these tasks. Understanding what mental functions each brain region controls tells us what it means when a region is activated by a given experimental task.

Here's how the study worked. Imagine that you are one of 32 volunteers recruited for a study of perception. You have to mentally rotate images of three-dimensional objects to determine if the objects are the same or different from a standard object. In the waiting room, you meet four other volunteers, with whom you begin to bond by practicing games on laptop computers, taking photos of one another, and chatting. They are really actors, "confederates" who will soon be faking their answers on the test trials so that they are in agreement with each other, but not with the correct responses that you generate. You are selected as the one to go into the scanner while the others outside look at the objects as a group and decide if they are same or different. The rest of the procedure follows Asch's original experiment, with the actors giving false answers, while you have to decide to go along with the majority or with your own perception.

What were the results? As in Asch's experiments, participants caved in to group pressure, on average giving the group's wrong answers 41% of the time. In yielding to the group's erroneous judgment, conformity showed up in the brain scan as increases in activity in the regions dedicated to vision and spatial awareness (specifically, activity

in the *right intraparietal sulcus*). Surprisingly, there were no changes in areas of the forebrain that deal with monitoring conflicts, planning, and other higher-order mental activities. Those who made independent judgments, on the other hand, going against the group, had extra brain activity in the areas associated with emotional salience (significance): the right **amygdala** and related regions. This means that resistance creates an emotional burden for those who maintain their independence—autonomy comes at a psychic cost.

"We like to think that seeing is believing," concludes neuroscientist Gregory Berns (2005), lead author of this research, and his colleagues, "but the study's findings show that seeing is believing what the group tells you to believe." This means that other people's views, when crystallized into a group consensus, can actually affect how we perceive important aspects of the external world, thus calling into question the nature of truth itself.

## 11.2.7: Resisting Conformity

It is only by becoming aware of our vulnerability to social pressure that we can begin to build resistance to conformity when it is not in our best interest to yield to the mentality of the herd. One problem is that many people maintain an *illusion of personal invulnerability*—a "Not ME" syndrome. They assume that others may be susceptible to situational forces, but that they are a different, special kind of folks who can resist such forces. Paradoxically, such a naïve view makes them *more* susceptible to influence agents because their guard is down, and they do not engage in mindful, critical analyses of situational forces acting on them. So, remember that our world is filled with hucksters, schemers, and corrupt folks who are intuitively savvy about how to get others to buy, invest, or sign on to their cause—especially those who are naïve, trusting, and have not learned to appreciate and mindfully resist our natural vulnerability to influence agents.

It is also important to mention that this research using neurobiology techniques to study social psychological processes is becoming widespread in the field of social psychology and is known as **social neuroscience**. Social neuroscience is an interdisciplinary field devoted to understanding how biological systems implement social processes and behavior, and to using biological concepts and methods to inform and improve theories of social processes and behavior. Researchers in this relatively new field are using their refined methodology to bring new understanding to traditional areas of prejudice, attitudes, self-control, and emotional regulation (Azar, 2002a; Cacioppo & Brentson, 2005; Decety & Cacioppo, 2011; Harmon-Jones & Winkielman, 2007).

## 11.2.8: Toddlers Conform, Apes Do Not

To find out whether very young children and apes would also show "normative" conformity, Daniel Haun and his research team presented 18 two-year-old children, 12 chimpanzees, and 12 orangutans with a reward-based task. Each participant was shown a box that contained three separate colored sections, each of which had a hole in the top. By interacting with the box, the participants learned that although the ball could be dropped in any of the three sections, only one of the sections would deliver a treat (peanuts for the apes and chocolate drops for the children). After familiarizing themselves with the box, the participants then watched while three familiar peers—all trained to strongly prefer the same colored section of the box, which was different from the participants' preference—deposited their balls. The tables then turned and the participant had to decide which section to drop his or her own balls into as his or her peers looked on. The results revealed that children were more likely to adjust their behavior to match that of their peers than were the apes, especially when their peers were watching. Whereas the human children conformed more than half of the time, the apes and orangutans almost always ignored their peers, opting instead to stick with the original strategy they had learned (Haun and others, 2014).

## 11.2.9: Groupthink

Groups themselves can also be pressured to conform. **Groupthink** is the term for this important social psychological process that encourages conformity in the thinking and decision making of individuals when they are in groups, like committees. In groupthink, members of the group attempt to conform their opinions to what each believes to be the consensus of the group—as first shown by psychologist Irving Janis (1972; Janis & Mann, 1977). This conformity bias leads the group to take actions each member might normally consider to be unwise.

Five conditions likely to promote groupthink are:

- Directive leadership, a dominant leader
- High group **cohesiveness**, with absence of dissenting views
- Lack of norms requiring methodical procedures for evidence collection/evaluation
- Homogeneity of members' social background and ideology
- High stress from external threats combined with low hope of a better solution than that of the group leader

This concept was first developed to help understand bad decisions made by the U.S. government regarding the bombing of Pearl Harbor in 1941, the Vietnam War, and especially the disastrous invasion of Cuba's Bay of Pigs in 1961. In that case, highly intelligent members of President John Kennedy's cabinet made a foolish decision to start an invasion against Cuba based on faulty reports by anti-Castro Cuban refugees. Later, others have cited groupthink as a factor that contributed to the faulty decisions in the Space Shuttle disasters and the bankruptcy of Enron Corporation. The 2003 decision by the Bush administration to wage preemptive war against Iraq was similarly based on several false beliefs among Bush's cabinet of otherwise smart advisors. They wanted to believe (their lie) that Saddam Hussein possessed nuclear weapons that he would deliver to Osama bin Laden to use in another terrorist attack on the United States (Schwartz & Wald, 2003).

The U.S. Senate Intelligence Committee investigating the justifications for the Iraq war actually cited groupthink as one of the processes involved in that decision. It is interesting to note the use of this social psychological concept in an official report of that government committee:

> The Intelligence Community (IC) has long struggled with the need for analysts to overcome analytic biases. . . . This bias that pervaded both the IC's analytic and collection communities represents "group think," a term coined by psychologist Irving Janis in the 1970's to describe a process in which a group can make bad or irrational decisions as each member of the group attempts to conform their opinions to what they believe to be the consensus of the group. IC personnel involved in the Iraq WMD issue demonstrated several aspects of groupthink: examining few alternatives, selective gathering of information, pressure to conform within the group or withhold criticism, and collective rationalization. (U.S. Senate, 2004, p. 4)

Recently, the U.S. Directorate of Intelligence has found a way to minimize the risk of groupthink by developing "Red Teams" whose task is to challenge all decisions with more reliable evidence. They insist on convergence of multiple sources of independent evidence to support all action-based decisions by government agencies. Businesses, news organizations, corporations, and even the Army all use Red Teams to play "devil's advocate" in important situations, especially when time is short and decisions are more likely to be rushed. Consultant Lisa McLeod (2013) says we should all use the Red Team approach when stakes are high, even in our personal lives. "Tattoos, first marriages, joining the Army, getting divorced, (all) have lifelong consequences. . . . Before you cast off your spouse (or get her name carved into your forearm) ask an older, smarter, calmer person, 'What potential negative consequences do you foresee?'" People who aren't as personally invested in the situation can often see perspectives that we, in the heat of the moment, may be blind to seeing correctly.



Think about future consequences of your actions, and get some friendly advice first.

### WRITING PROMPT

**Pressure to Conform**

Describe a time when you fell prey to groupthink, at home, in school, with buddies or at work.

> The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

# 11.3: Obedience to Authority

**Objective:** Explain the power of obedience to authority in various circumstances

So far, we have emphasized how groups influence individuals. But the arrow of influence also points the other way: Certain individuals, such as charismatic leaders and authorities, can command the obedience of groups—even large masses of people. The ultimate demonstration of this effect was seen in the World War II era, with the emergence of Adolf Hitler in Germany and Benito Mussolini in Italy. These dictators transformed the rational citizens of whole nations into mindlessly loyal followers of a fascist ideology bent on world conquest. On the side of democracy was the rational calming impact of Britain's new prime minister, Winston Churchill, at a critical time when that nation was on the brink of disaster under constant bombing by Hitler's

missiles and Luftwaffe air force. In 1939, Churchill championed the motto KEEP CALM, CARRY ON. Curiously, that motto has been revived recently in posters, T-shirts, and iPhone cases.



The World War II theme of the British prime minister has become a modern slogan as well in our high-stress lives.

Modern social psychology had its origins in this World War II wartime crucible of fear and prejudice. It was natural, then, that many of the early social psychologists focused on the personalities of people drawn into fascist groups. Specifically, they looked for an *authoritarian personality* behind the fascist group mentality (Adorno and others, 1950). But that dispositional analysis failed to recognize the social, economic, historical, and political realities operating on those European populations at that time. To clarify this point, let us reflect for a moment on some more modern examples of unquestioning obedience to authority.

**POST-WAR ATROCITIES LINKED TO OBEDIENCE TO AUTHORITY**  In Cambodia in the 1970s, Pol Pot, the brutal dictator and leader of the Khmer Rouge, decided to eliminate social classes by forcing everyone to work on farms. Those likely to resist—the educated, intellectuals, and foreigners—were tortured, starved to death, and murdered. In a 4-year reign of terror, known as the Killing Fields of Cambodia, nearly 2 million people were killed.

In 1978, a group of American citizens left California to relocate their Protestant religious order, called Peoples Temple, in the South American jungle of Guyana. There, following the orders of their charismatic leader, the Reverend Jim Jones, nearly 1000 members of the Peoples Temple willingly administered lethal doses of cyanide to hundreds of their children, then to their parents, and then to themselves. Other members of this cult, their friends, murdered those who refused.

Then, in 1993, 100 members of a religious sect joined their leader, David Koresh, in defying federal agents who

had surrounded their compound in Waco, Texas, searching for weapons violations. After a standoff of several weeks, the Branch Davidians set fire to their quarters rather than surrender. In the resulting conflagration, scores of men, women, and children perished. Two years later, in retaliation against the government's mishandling of the Waco siege, Timothy McVeigh and Terry Nichols engineered a domestic terrorist attack on a federal building in Oklahoma City. Their powerful bombs killed 168 people and injured more than 680 others. The blast destroyed or damaged 324 buildings within a 16-block radius, destroyed or burned 86 cars, and shattered glass in 258 nearby buildings causing at least an estimated $652 million worth of damage. Two years after that, 39 college-educated members of another group calling itself Heaven's Gate followed their leader's command to commit mass suicide in order to achieve a "higher plane" of being. And, on September 11, 2001, followers of Osama bin Laden weaponized American commercial airliners and piloted them into the Pentagon and the World Trade Center. In addition to murdering thousands of people, these men knowingly committed suicide. And even more recently, scores of suicide bombers, both men and women, have blown themselves apart as "revolutionary martyrs" in the Palestinian campaign against Israel, as well as in Iraq. A new Middle East terrorist movement, known as ISIS, is using sophisticated high-tech means for recruiting youth around the world to their Islamic evolutionary cause, via Facebook, Twitter, and other social media.

British author C. P. Snow reminds us:

*"When you think of the long and gloomy history of man, you will find more hideous crimes have been committed in the name of obedience than have been committed in the name of rebellion."*

Are the people who commit these atrocities mentally deranged, stupid, and totally strange creatures—unlike us? Or are there some conditions under which you would blindly obey an order from a person you love and respect (or fear) to do such extreme deeds? Would you, for example, obey an authority figure who told you to electrocute a stranger? Of course, you are saying to yourself, "No way," "Not me," "I am not that kind of person." But think about what each of the people we have described previously must have been thinking *before* they were caught up in their "obedience trap"—the same thing as you, probably.

Let's return to our opening story of Bill trapped in the experiment created by social psychologist Stanley Milgram (1965, 1974). His research revealed that the willingness of people to follow the orders of an authority, even potentially lethal ones, is not confined to a few extreme personalities or deranged individuals. This finding, along with certain ethical issues that the experiment raises, places Milgram's work

at the center of one of the biggest controversies in psychology (Blass, 1996). In a moment, we will look at more of the findings generated by that program of research on obedience and visit a series of follow-up studies that expand its relevance and applicability to everyday life settings and to recent media exploitation of this Milgram effect on French reality TV. But first, let's consider how some experts on human behavior failed to predict the high rate of obedience found in this research.

## 11.3.1:  Milgram's Research Revisited

Milgram described his experimental procedure to each of 40 psychiatrists and then asked them to estimate the percentage of American citizens who would flip the switch to each of the 30 shock levels in the experiment. On average, they predicted that fewer than 1% would go all the way to the end, that only sadists would engage in such sadistic behavior, and that most people would drop out at the 10th level of 150 volts.

**The Milgram Obedience Experiment**



The "shock generator" looked ominous but didn't actually deliver shocks to the "Learner" (middle photo), who was a confederate of the experimenter. The last photo shows the experimenter giving instructions to the "Teacher," who is seated in front of the shock generator.

They could not have been more wrong! These experts on human behavior erred for two reasons.

1. First, they ignored all the situational determinants of behavior in the procedural description of the experiment; that is, they failed to recognize the significance of the authority power, the roles of Teacher and Learner, the rules, the diffusion of personal responsibility (when the experimenter claimed to the "Teacher" that he would be responsible for anything that might happen to the "Learner"), the definition of what were appropriate and expected behaviors by the Teacher, and the other social pressures toward obedience.

2. Second, their training in traditional psychiatry led them to rely too heavily on the *dispositional perspective* to understand unusual behavior—to look for explanations within the individual's personality makeup and not in the external behavioral context. Thus, their estimate of only 1% as blindly obedient to authority, as going all the way up to the maximum shock level of 450 volts, is a base rate against which we can assess what actually happened in this research.

This dual tendency of overestimating person power and underestimating situation power is known as the *fundamental attribution error (FAE).* It is one of the most common errors in judgment we humans make.

Social psychologists argue that this tendency has limited our appreciation of the extent to which social situations offer an important explanation for certain behaviors. Of course, it is not a matter of either-or, but usually there is an *interaction* between dispositional tendencies and situational forces to shape the final behavior that we observe and want to understand. This **person–situation interaction** is at the core of both personality and social psychology, yet relatively little research has been done to identify the relative contributions of each factor for a given behavior, in a particular social setting, for specific kinds of individuals (Kihlstrom, 2013).

**MILGRAM MANIPULATES MORE VARIABLES**   Milgram also wanted to show that his results were not due to the authority power of Yale University—which is what New Haven is all about. So he transplanted his laboratory to a rundown office building in downtown Bridgeport, Connecticut, and repeated the experiment as a project of a fictitious, private research firm with no apparent connection to Yale. There he tested another 500 ordinary citizens and added female participants as Teachers to the experimental mix. So what was the actual level of blind obedience to authority in these new circumstances?

As with those tested at Yale, the majority of these Bridgeport participants obeyed fully: two of every three (65%) went all the way up the maximum shock level of

450 volts! These "Teachers" shocked their "Learner" over and over again despite his increasingly desperate pleas to stop. This was as true of the younger and older, men and women, well educated and less so, and across many occupations and careers.

## 11.3.2: Variations on an Obedience Theme

In total, Milgram carried out 24 different experimental scenarios. Each time, he varied one social-psychological **independent variable** and observed its impact on the extent of obedience to the authority's pressure to continue shocking the Learner. He added women, varied the physical proximity or remoteness of either the Experimenter-Teacher link or the Teacher-Learner link, had peers model rebellion or full obedience before the Teacher began, and added other social variations in each of his experiments.

As you can see in Figure 11.4, the data for 16 of these variations clearly reveal the extreme pliability of human nature: Under some conditions, almost everyone could be totally obedient, while under other conditions, almost everyone could resist authority pressures. It all depended on the specific situational setup.

- *Want maximum obedience?* Allow the new Teacher to first observe someone else administering the final shock level—Milgram saw compliance rates soar to more than 90% in that condition.

- *Want people to resist authority pressures?* Provide social models of peers who rebel, which dropped compliance rates to less than 10%.

Participants also refused to deliver shocks if the Learner said he wanted to be shocked; that's masochistic, and they are not sadists! In addition, they were reluctant to give high levels of shock when the Experimenter sat in as the Learner and they were supposed to shock him. On the other hand, they were more likely to shock when the Learner was remote rather than nearby. In all the variations, with a diverse range of ordinary American citizens of widely varying ages, occupations, and of both sexes, it was possible to elicit low, medium, or high levels of obedience with a flick of the *Situational Switch*—as if one were simply

---

**Figure 11.4** Obedience in Milgram's Experiments

The graph shows some examples of how various situational variations influence obedience levels in Milgram's studies of obedience to authority.



1. Learner demands to be shocked
2. Authority as a victim, an ordinary man commanding
3. Two authorities, contradictary commands
4. Subject free to choose shock level
5. Two peers rebel
6. An ordinary man gives orders
7. Remote authority
8. Touch proximity
9. Proximity
10. Institutional context
11. Voice feedback
12. Remote victim
13. Women as subjects
14. Two authorities, one as victim
15. The subject as bystander
16. A peer administers shock

turning a Human Nature Dial within their psyches. This large sample of a thousand ordinary citizens from such varied backgrounds makes the results of *Milgram's Obedience to Authority* studies among the most generalizable in all the social sciences.

There is an important message we want to highlight about these findings: We are all powerful social models for others who observe what we do, whether or not we are aware of being observed. When we do evil deeds, other observers are likely to imitate us, but when we do heroic deeds, we model human goodness for others to emulate. So, be aware of your ripple effect—for better or for worse.

**REFLECTIONS ON MILGRAM'S CLASSIC WORK**    Of course, no shocks were ever delivered to the Learner. The "victim" of the "shocks" was actually an accomplished actor who congenially chatted with his "Teacher" after the experiment and assured him he was fine and had never felt any shocks. All of his comments during the study had been recorded previously to standardize the procedure across the many trials and variations of the study. Moreover, the powerful authority figure in the gray lab coat was not a "real" authority, not Milgram himself, but a high school biology teacher! And, for all the "Teachers" knew, when once the Learner fell silent after the 330 volt shock, he may have been unconscious or dead—but in any case his memory could not be improved by further shocks. Nevertheless, hundreds of people mindlessly obeyed and continued doing as ordered even though it made no sense—had they thought rationally and critically about what they were doing. They should have realized that the study was not about improving the learner's memory; it was about *them* as reluctant punishing agents.

Such research, and the many replications that followed in countries around the world, challenges our assumption that "good people" cannot be seduced into becoming perpetrators of evil. It suggests that the line between good and evil is not fixed and permanent, but rather is sufficiently permeable to allow almost anyone to move from one behavioral realm to the other. It all depends on the power of the new, unfamiliar situation they face and with which they must cope.

Before moving on to raise the issue of disobedience to unjust authority, it is important to note two recent Milgram-related events. An entire issue of a prestigious academic journal was devoted to "Milgram at 50: Exploring the Enduring Relevance of Psychology's Most Famous Studies" (Haslam and others, 2014). Also, in 2015, Milgram goes to the movies! The drama of Stanley Milgram's life and his full body of research can be seen in a compelling Hollywood docudrama, *Experimenter.* Milgram is played by Peter Sarsgard, his wife Alexandra

is played by actress Winona Ryder, and Michael Almereyda wrote and directed the film.

One final historical curiosity is that Stanley Milgram and Phil Zimbardo were high school classmates from James Monroe H. S. in the Bronx, New York City, graduating in 1950 to go on to lead the conceptual way of promoting situational power.

### 11.3.3:  Heroic Defiance

This concept of situational power faces one challenge: that of individual heroic defiance. *Heroes* are people who are able to resist situational forces that overwhelm their peers, and thus remain true to their personal values. They are the "whistle-blowers" who challenge corrupt or immoral systems by not going along with the company norm or institutional SOP (standard operating procedures).

An Army reservist, Joe Darby, became one such hero when, in 2004, he exposed the horrendous abuses of prisoners by his buddies at Iraq's Abu Ghraib Prison. He did so by showing to a senior investigating officer a CD with the images of prisoner abuse taken by other MPs on the night shift. The officer then initiated an investigation that stopped those abuses, which had been going on for months.

But such "heroes" are often despised by their former colleagues and made to pay a high price for not being a silent "team player." Darby, for example, had to go into hiding under protective custody for 3 years, along with his wife and mother, because of death threats against him by soldiers in his battalion and by people in their hometown for humiliating the American military in exposing those photos of sadistic abuse of prisoners. After being released in 2007, Darby did finally receive a hero award at the Kennedy Center in Washington, DC.

Heroes come in all sizes and from all backgrounds.

During the opening ceremonies of the 2008 Olympics in Beijing, China, a little boy was ushered in on the shoulders of Yao Ming, the Houston Rockets' star basketball player. The 9-year-old boy, Lin Hao, was in his school in Szechuan province when a massive earthquake hit. He survived the collapse of the school roof, but most of the other students were killed. While escaping, he noticed two children struggling to get out from under the debris. He raced back to save them, and when asked why he risked his life in doing so, Lin's reply was that of a "duty hero." He said that he was the hall monitor, and it was his job to look after his classmates. Here is a fine example of transforming compassion into heroic action. Our behavioral definition of *heroism*: a voluntary act on behalf of others in need, or in defense of a moral cause, done with awareness of potential personal risk or cost, and without expectation of tangible reward.

We want to highlight for you the inspiring story of a young Pakistani girl, Malala Yousafzai, whose courageous heroism earned her the 2014 Nobel Peace Prize, at age 17, the youngest in history. Malala loved reading books and going to school, until the Taliban closed the schools and forbade girls to read or ever become educated. She decided to openly challenge such restrictions on her development and that of other youngsters in her country—knowing the likely consequences. Malala was shot in the head by a Taliban gunman, survived, and with the support of her father, continued to defy this unjust authority on global media platforms. Watch here: https://www.youtube.com/watch?v=MOqIotJrFVM

Curiously, there is relatively little systematic research on heroes and heroism, especially compared to the abundance of research on the dark side of human nature, as revealed throughout this chapter. Even in the positive psychology movement created by Martin Seligman at University of Pennsylvania, those terms are not in their lexicon. Compassion, empathy, and moral courage are included because they are "private strengths and virtues" while heroism is an action. But it is only by acting out those inner virtues that we can make a difference in people's lives and ultimately change the world. Your senior author has created a nonprofit foundation, entitled the Heroic Imagination Project, that uses basic psychological ideas to teach people how to become *heroes in training:* to stand up, speak out, and take action in challenging situations in their lives. Visit the HIP website to learn more.

# 11.4: Cross-Cultural Tests of Milgram's Research

**Objective:** **Use Milgram's research findings to influence people to engage in compassionate acts**

Because of its structural design and its detailed protocol, the basic Milgram obedience experiment encouraged replication by independent investigators in many countries. A recent comparative analysis was made of the rates of obedience across eight studies conducted in the United States and of nine replications in European, African, and Asian countries. Similarly high levels of compliance were found in all these different studies and nations. The average obedience level of 61% found in the U.S. replications was matched by the 66% obedience found across all the other national samples. The range of obedience went from a low of 31% to a high of 91% in the U.S. studies, and from a low of 28% (Australia) to a high of 88% (South Africa) in the cross-national replications. There was also stability of obedience from place to place and across decades of time.

There was no association between the year a study was done (between 1963 and 1985) and the degree of obedience (Blass, 2004).

## 11.4.1: Does Milgram's Obedience Power Still Apply?

Using a variation of the Milgram paradigm that substituted verbal criticism for the "shocks," researchers at Utrecht University in Holland and Palermo University in Sicily found obedience rates comparable to some of Milgram's studies. The situation they created was that of a coach who had to deliver increasingly critical verbal feedback to his performer when he did poorly, allegedly to build resilience in performers. The critical feedback given to the performer consisted of a series of progressively negative comments about his performance and rude remarks about his lack of ability. For example, a mild criticism was "You are going bad," a moderately negative feedback was "You are really ridiculous!" and an extremely negative feedback was "You are really the most stupid person I have ever seen!" Obedience to authority was determined as delivering the full set of 15 hostile comments. In one of the Utrecht studies, more than 90% of the students playing the role of coach went all the way (Meeus & Raaijmakers, 1986). In the Sicilian study using that same procedure, obedience was only 30%, but that was in a condition where coach and performer were in close proximity and the experimenter was in an adjacent room. These findings mirror exactly what Milgram found for those same experimental variations (Bocchiaro & Zimbardo, 2010).

An even closer approximation to Milgram's studies was undertaken by researcher Jerry Burger (2009) in collaboration with a major news network, using college students at Santa Clara University in California as participants. For ethical reasons, the study was terminated when the teachers pressed the 150-volt switch, the tenth level (which had, in Milgram's findings, appeared to be a key decision point). Once again, the majority obeyed the dictates of the experiment, and Burger's findings, four decades later, were virtually indistinguishable from Milgram's.

Then, in 2010, a television show in France staged the Milgram experiment for a live audience, who got to vote to shock or not to shock the victim in distress. Egged on by a glamorous presenter, cries of "punishment" from a studio audience, and dramatic music, the overwhelming majority of participants obeyed orders to continue delivering the shocks—despite the man's screams of agony and pleas for them to stop. The percentage giving maximum shock soared to 80% in what the producers termed "The Game of Death"!

## 11.4.2: Why Do We Obey Authority?

From the many variations Milgram conducted on his original study, along with these more recent replications, we can conclude that people tend to be obedient under the following conditions:

- When a peer models obedience by complying with the authority figure's commands
- When the victim is remote from the Teacher and cannot be seen or heard, thereby promoting a sense of anonymity and distance
- When the Teacher is under direct surveillance of the authority figure
- When the authority figure has higher status than the Teacher

What, then, are the lessons to be learned? If you carefully review these conditions (refer back to Figure 11.4), you can see that the obedience effect results from situational variables and not personality variables. In fact, personality tests administered to the participants did not reveal any traits that differentiated those who obeyed from those who refused, nor did they identify any psychological disturbance or abnormality in the obedient punishers. These findings enable us to rule out individual personality as a variable in obedient behavior. Going beyond the experimental findings to apply them to real-world settings, we can outline 10 basic steps or processes that can seduce ordinary, even good, people to go down the slippery slope of evil, as seen in Table 11.3.

**Table 11.3** Ten Steps Toward Evil—Getting Good People to Harm Others

Each of these situational influences has been shown to influence good people to commit harmful acts. We'd like you to consider how each step could be converted to create the opposite effect—influencing people to be kind to others and engage in acts of everyday heroism.

- Provide people with an ideology to justify beliefs for actions
- Make people take a small first step toward a harmful act with a minor, trivial action and then gradually increase those small actions.
- Slowly transform a once-compassionate leader into a dictatorial figure.
- Provide people with vague and ever-changing rules.
- Relabel the situation's actors and their actions to legitimize the ideology.
- Provide people with social models of compliance.
- Allow verbal dissent, but only if people continue to comply behaviorally with orders.
- Encourage dehumanizing the victim.
- Diffuse responsibility.
- Make exiting the situation difficult.

The common social norm of obedience to authority truly does have the power to trump individual character. But it is important to remind ourselves that conformity to rules, laws, regulations, and social norms is essential for any group, society, and nation to function. That means

individual freedom to act out one's personal choices must be moderated by what is best for the group which is one basic meaning of *democracy*.

## 11.4.3: Some Real-World Extensions of the Milgram Obedience to Authority Paradigm

Let's look at blind obedience to authority in two real-life settings:

1. First, a study of nurses' willingness to follow a doctor's orders that were not legitimate
2. Second, an actual incident in which store managers followed telephoned orders (from a pervert pretending to be a police officer) to sexually violate the privacy of another employee

**NURSES OBEY DOCTOR'S DANGEROUS ORDERS**   If the relationship between teachers and students is one of power-based authority, how much more so is that between physicians and nurses? To find out, a team of doctors and nurses tested obedience in their authority system by determining whether nurses would obey or disobey an illegitimate request by an unknown physician in a real hospital setting (Hofling and others, 1966). Each of 22 nurses individually received a call from an unknown staff doctor who told her to administer a medication to his patient immediately, before he got to the hospital. His order doubled the maximum amount indicated as a high dose. When this dilemma was presented as a hypothetical scenario, 10 of 12 nurses in that hospital said they would refuse to obey because it violated hospital procedures (Krackow & Blass, 1995). However, the power of the situation took over on the hospital ward: Twenty-one of 22 nurses put to the test started to pour the medication (actually a fake drug) to administer to the patient—before the researcher stopped them from doing so. The one who refused—that solitary disobedient nurse—should have been given a raise and a hero's medal!

**THE FAST-FOOD RESTAURANT AUTHORITY HOAX**  Another remarkable real-world illustration of the Milgram effect in action comes from a telephone hoax perpetrated in 68 fast-food restaurants across 32 states. Assistant store managers blindly followed the orders of a phone caller, pretending to be a police officer, who insisted that they strip search a young female employee the "officer" said had stolen property on her.

Here's what happened: The alleged officer instructed the assistant manager to detain the employee in the back room, strip her naked, and search her extensively for the stolen goods. The caller insisted on being told in graphic detail what was happening, and all the while the video surveillance

cameras were recording these remarkable events as they unfolded. In a Kentucky McDonald's the abuse escalated to having her masturbate and perform sexual acts on a male assistant who was supposed to be guarding her (Wolfson, 2005). It was all recorded on security cameras, and some of it can be seen now online (but not the sexual violation scenes). You can find a link to that site at the end of this chapter.

This bizarre authority-influence-in-absentia scheme seduced dozens of ordinary people to violate store policy, and presumably their own ethical and moral principles, to molest and humiliate honest young employees. In 2007, the perpetrator—a former corrections officer—was uncovered, but freed for lack of direct evidence. One of the victims was a 19-year-old girl who was sexually abused and received a large settlement from her employer. This nightmare experience of sexual abuse for the many young, innocent women caught in this authority hoax is captured in a compelling movie, *Compliance*, by Craig Zobel, that premiered at Sundance Film Festival, 2012. We have also included a link to a video with more information about this disturbing incident: View the video here: https://www.youtube.com/watch?v=8mpAbig8ttY

One reasonable reaction you might have to learning about this hoax is to focus on the dispositions of the victim and her assailants, as naïve, ignorant, gullible individuals. However, when we learn that this scam has been carried out successfully in similar settings across many states, in many different fast-food restaurants, with dozens of assistant managers deceived, then our analysis must shift away from simply blaming the victims to recognizing the power of situational forces involved in this scenario. Moreover, it is corroborated by decades of research in social psychology which, sadly, show the same effects. One of the assistant store managers, Donna Summer, warned reporters not to judge so quickly because they couldn't predict what they might have done unless they experienced the same *situation* (Gibney, 2006). And that is the exact advice we give to you after reading this chapter and becoming aware of this **fundamental attribution error** in human judgment.

## 11.5: The Bystander Problem: The Evil of Inaction

**Objective:** Analyze the bystander intervention problem

"Throughout history, it has been the inaction of those who could have acted; the indifference of those who should have known better; the silence of the voice of justice when it mattered most; that has made it possible for evil to triumph."
—Haile Selassie, Former Emperor of Ethiopia

Harm doesn't always come from a hurtful act. It can also come from *inaction* when someone needs help. We can illustrate this fact with an event that stunned the nation and became a legend about the apparent callousness of human nature. On March 13, 1964, the *New York Times* reported that 38 citizens of Queens watched for more than half an hour as a man with a knife stalked and killed Kitty Genovese, one of their neighbors, in three separate attacks. The article said that the sound of the bystanders' voices and the sudden glow of their bedroom lights twice interrupted the assault, but each time the assailant returned and stabbed her again. According to the report, only one witness called the police—after the woman had been murdered.



Kitty Genovese, victim of brutality and bystander indifference in New York City, 1964.

The story of Kitty Genovese's murder dominated the news for days, as a shocked nation was served up media commentary that played on the angles of bystander apathy and the indifference of New Yorkers. Why didn't they help? Was it something about New York—or could the same thing happen anywhere?

A recent investigation of police records and other archival materials has found that the real story was different from the original *Times* report (Manning and others, 2007). For one thing, there was no basis for the claim that 38 people witnessed the event. Further, most of the assault took place in an entry hall, out of view of neighbors. And, in fact, a few phone calls to the police *were* made during the attack. Remember also, at that time, there was no 911 emergency number to facilitate such calls. It was still a tragedy, of course, but not one that proved the people of New York to be the indifferent bystanders the original story made them out to be. For psychology, the important result of this Kitty Genovese incident was that it led to some important research on bystander intervention that focused on the *power of the situation.* Under what circumstances will people help—or not?

Sadly, the general issue of public apathy in failing to get involved in helping someone in distress is not limited

in time or geography. In October 2009, after a school dance at a Richmond, California High School, a 15-year-old female student was brutally gang raped and beaten by at least five men and boys over a 2-hour period. As many as a dozen people looked on and did nothing; none called 911 emergency on their cell phones, and some were even reported to have been texting about this "event." And in Panama City, Florida in 2015, a spring break crowd numbering in the hundreds clustered around a young woman as she was gang raped in broad daylight—some even recording the event with their phones. Such instances of bystander inaction occur far too often around the world, when they should be rare.

## 11.5.1: Contrived Emergencies

The Kitty Genovese murder inspired two young social psychologists, Bibb Latané and John Darley, to begin a series of studies on the **bystander intervention problem**. These studies all ingeniously created laboratory analogues of the difficulties faced by bystanders in real emergency situations. In one such experiment, a college student, placed alone in a room with an intercom, was led to believe that he was communicating with one or more students in adjacent rooms. During a discussion about personal problems, this individual heard what sounded like another student having a seizure and gasping for help. During the "seizure," the bystander couldn't talk to the other students or find out what, if anything, they were doing about the emergency.

**Would the bystander report the emergency, and if so, would the number of people he believed were in the discussion group with him influence how quickly he acted? What's your opinion?**

It turned out that the response did indeed depend on the number of other bystanders the student thought were present. The more people believed to be listening in on the situation in other rooms, the slower the student was to report the seizure—if he did so at all. Personality tests showed no significant relationship between particular personality characteristics of the participants and their speed or likelihood of intervening—it was completely situational. As you can see in Figure 11.5, all those in a two-person situation intervened in less than 3 minutes, but only 60% of those who thought they were part of a large group acted at all to inform the experimenter of the possible emergency (Latané & Darley, 1968).

By way of explanation, Darley and Latané proposed that the likelihood of intervention decreases as the group size increases because each person assumes that others will help, and so he or she does not have to make that

**Figure 11.5** Bystander Intervention in Emergencies as a Function of Group Size

The more people present in a crisis, the less likely it is that any one bystander will intervene. As this summary of research findings shows, bystanders act most quickly in small, two-person groupings.

commitment. Individuals who perceive themselves as part of a large group of potential interveners experience a **diffusion of responsibility**: a dilution or weakening of each group member's obligation to help or become personally involved. You may have experienced moments of diffused responsibility if you have driven past a disabled car beside a busy highway because you believed "surely someone else" would stop and help—as you went on your way.

Another factor was undoubtedly also at work: **conformity**. As you will remember from our core concept and from Asch's studies of conformity, *when people don't know what to do, they take their cues from others.* The same thing occurred in the bystander studies, where those who failed to intervene were observing and conforming to the behavior of other people who were doing nothing. They allowed the absence of helping by others to *define the situation* for them as one in which the norm was *Do Nothing, Don't Get Involved*. However, as soon as one person intervenes to help, in seconds others join in as co-helpers. New norm: *Do Something. Help. Take Action.* Our message to you: Be that person—enjoy the Power of The One!

---

**WATCH** The Bystander Effect

Bystander indifference at London's Liverpool train station, where 35 people pass by a young woman in apparent distress—with no one helping for 5 minutes. But when one person helps, the do-nothing spell is broken and others immediately join in. Watch this video to learn more: https://www.youtube.com/watch?v=OSsPfbup0ac

## 11.5.2:  Does Training Encourage Helping?

Two studies suggest that the bystander problem can be countered with appropriate training. Ted Huston and his colleagues (1981) found no personality traits that distinguished people who had helped in actual emergency situations from those who had not. But they did find that helpers more often had had some medical, police, first-aid, or CPR training in dealing with emergency situations. And another study shows that even a psychology class lecture on the bystander problem can help (Beaman and others, 1978). Students had an opportunity to help a "victim" slumped in a doorway while walking by with a non-responsive confederate of the experimenter. Those who had attended a lecture on bystander intervention were twice as likely to stop and attempt to help as those who had not received the lecture on helping. More recently, bystander education interventions targeting aggression and sexual assault in schools have successfully increased helping behaviors and attitudes (Pfetsch and others, 2011;

Katz & Moore, 2013). Education can make a difference; we hope *you* will also use the lessons of this chapter in constructive ways.

## 11.5.3:  Need Help? Ask for It!

To demonstrate the positive effects of situational power, social psychologist Tom Moriarity (1975) arranged two fascinating experiments.

1. In the first study, New Yorkers watched as a thief snatched a woman's suitcase in a restaurant when she left her table.
2. In the second, they watched a thief grab a portable radio from a beach blanket when the owner left it for a few minutes.

What did these onlookers do? Some did nothing, letting the thief go on his merry way. But others did intervene. What were the conditions under which some helped and others did not?

In each experiment, the would-be theft victim (the experimenter's accomplice) had first asked the soon-to-be observer of the crime either "Do you have the time?" or "Will you please keep an eye on my bag (radio) while I'm gone?" The first interaction elicited no personal responsibility, and almost all of the bystanders stood by idly as the theft unfolded. However, of those who had agreed to watch the victim's property, almost every bystander intervened. They called for help, and some even tackled the runaway thief on the beach!

The encouraging message is that we can often convert apathy to personal action and transform callousness to kindness just by asking for it. The mere act of requesting a favor forges a special human bond that involves other people in ways that materially change the situation. It makes them feel responsible to you and thereby responsible for what happens in your shared social world. Under such conditions, ordinary people can become Good Samaritans. But we will see in the following *Do It Yourself* box that the *situation* can make a theology student about to deliver a sermon about the Good Samaritan effect into a Bad Samaritan—in one particular circumstance.

Your chances of getting aid from would-be helpers can be increased in several ways based on what we have learned across a number of studies (Schroeder & Prentice, 1995):

- **Ask for help.** Let others know you need it rather than assuming they realize your need or know what is required.
- **Reduce the ambiguity of the situation** by clearly explaining the problem and what should be done: "She's fainted! Call an ambulance right away," or

"Someone broke into my house—call the police and give them this address!"

- **Identify specific individuals** so they do not diffuse responsibility with others present: "You, in the red shirt: Call 911!" or "Will the person in the blue Toyota please call for a tow truck right away?"

None of these tactics guarantees the safety of your person or possessions, of course. Nevertheless, they probably represent your best hope if you find yourself, alone in a crowd, facing a real emergency.

# Do It Yourself!
# What Makes a Samaritan Good or Bad?

Now that you know something about bystander intervention, let's see how good you are at picking the crucial variable out of a bystander situation inspired by the biblical tale of the Good Samaritan (see Luke 10:30–37). In the biblical account, several important people are too busy to help a stranger in distress. He is finally assisted by an outsider, a Samaritan, who takes the time to offer aid.

- *Could the failure of the distressed individual's countrymen to help be due to character flaws or personal dispositions?*
- *Or was it determined by the situation?*

Social psychologists decided to put students at the Princeton Theological Seminary into a similar situation. It was made all the more ironic because the students thought that they were being evaluated on the quality of the sermons they were about to deliver on the parable of the Good Samaritan. Let's see what happened when these seminarians were given an opportunity to help someone in distress.

With sermon in hand, each was directed to a nearby building where the sermon was to be recorded. But as the student walked down an alley between the two buildings, he or she came upon a man slumped in a doorway, in obvious need of help. The student now had the chance to practice what he or she was about to preach. What would you guess was the crucial variable that predicted how likely a seminarian—ready to preach about the Good Samaritan—was to help a person in distress? Choose one:

- How religious the seminarian was (as rated by his classmates).
- How "neurotic" the seminarian was (as rated on the "Big Five" personality traits).
- How much of a hurry the seminarian was in.
- How old the seminarian was.

All of the dispositional variables (personal characteristics) of the seminarians were controlled by random assignment of subjects to three different conditions. Thus, we know that personality was not the determining factor. Rather, it was a situational variable: time. Before the seminarians left the briefing room to have their sermons recorded in a nearby building, each was told how much time he had to get to the studio. Some were assigned to a late condition in which they had to hurry to make the next session; others to an on-time condition in which they would make the next session just on time; and a third group to an early condition in which they had a few spare minutes before they would be recorded.

What were the results?

Of those who were in a hurry, only 10% helped. Ninety percent failed to act as Good Samaritans! If they were on time, 45% helped the stranger. The greatest bystander intervention came from 63% of those who were not in any time bind (see Figure 11.6).

---

**Figure 11.6**  Results of the "Good Samaritan" Study

Even on their way to deliver the Good Samaritan Sermon, the vast majority of seminary students did not stop to help a distressed victim.



---

Remarkably, the manipulation of time urgency made those in the "late" condition six times less likely to help than those in the "early" condition. While fulfilling their obligation to hurry, these individuals appeared to have a single-minded purpose that blinded them to other events around them. Again, it was the power of the situation.

## Psychology Matters

# On Being "Shoe" at Yale U

When I (PGZ) arrived at Yale University to start my graduate career in the mid-1950s, I was dressed in all my South Bronx splendor—blue suede shoes, peg pants, long dangling key

chain, big rolled collar, and other cool clothes. A month or two later, I was wearing chino pants, button-down shirts, and loafer-type shoes. I was not fully aware of the subtle social pressures to change my "taste" in apparel, but knew that I felt more "in" in those weird Yalie clothes than I had in my good old Bronx duds. But as a budding psychologist, I used my personal case study to motivate me to find out more about that unwritten dress code, one that everyone around the campus at that time was following as if a Marine drill instructor were ordering our total mindless compliance.

My interviews with seniors revealed that indeed there was a powerful dress code that the **in-group** formulated regularly to distinguish them from the mass of **out-group** pretenders. Every single item of clothing could be identified by those in the know as socially appropriate at that time for real Yale men to wear (it was all male at that time). I was informed that the underlying concept was termed "shoe." (Yale men of that era and earlier could be identified as wearing white buck shoes.) To be "shoe" was to be in, to be cool, to be with it, to be right on, and so forth. Not only was every bit of clothing indexed as to its degree of "shoeness," but so was everything else in that universe. Tennis, golf, and crew were shoe; basketball was not. Asking questions in lecture classes was not shoe; tailgating before football games was shoe, but only if done with the right style or panache. Of equal interest to me was the fact that shoe ratings changed periodically to keep outsiders from being mistaken as really true blue shoe. One year, the Yale senior ring was shoe to wear, the next year it might be unshoe; or handmade bow ties would become unshoe and clip-on bow ties would vault from low-shoe to high-shoe rating.

My team of informants helped me to form an index of the shoe strengths of every conceivable item of clothing that a Yale student might wear that year. With the help of my introductory psychology students, we went into the dormitories and found out what students from each college class actually had in their wardrobes. We then multiplied each of those items of clothing by their Shoe Index and averaged those ratings across each class from frosh to senior. Next, we separated out students' shoe scores by whether they had come from prep schools versus public high schools.

Three major significant results were obvious from our graphs of the quantification of shoeness at Yale:

1. Student wardrobes became ever more shoe as they progress from lowly frosh up to high-powered seniors.

2. Preppy frosh were much more shoe than were their classmates from public high schools.

3. Over the 4 years, the gap between prep schoolers and public schoolers diminished, so that by senior year they were almost equally shoe.

When Yale became coed in the next decade, this kind of "shoeness" became less apparent, went underground, and now may exist only in very modified forms. But let this be a lesson to you whatever school you are in: Much of what you think is the You in Your Taste is really the Them in social conformity pressures subtly imposed on you to be like Them in order to be liked by Them. All too often, we go along to get along (Zimbardo, 2008).

# Key Question: Constructing Social Reality: What Influences Our Judgments of Others?

**Core Concept 11.2**

**The judgments we make about others depend not only on their behavior but also on our interpretation of their actions within a social context.**

Powerful as a social situation is, it doesn't account for everything that people do. For example, it does not account for the individual differences we see in people's choices of friends and romantic partners, nor does it account for their prejudices. To explain the patterns we find in social interaction, we must also look at cognitive processes. In the language of social psychology, we need to understand how we construct our **social reality**—our subjective interpretations of other people and of our relationships. Thus, the social reality we construct determines whom we find attractive, whom we find threatening, whom we seek out, and whom we avoid. This, then, leads us to the second lesson of social psychology, captured in our next core concept:

The judgments we make about others depend not only on their behavior but also on our interpretation of their actions within a social context.

We will illustrate how these cognitive factors operate by analyzing how they affect our attitudes toward other people. Let's start out by asking a simple question: What makes people like each other? That is, what produces interpersonal attraction?

By the end of this section, you will be able to:

**11.6** **Describe the four powerful sources of reward that predict interpersonal attraction**

**11.7** **Review the three components of the triangular theory of love**

**11.8**  Evaluate the dual tendency to overemphasize personal traits while minimizing situational influences

**11.9**  Compare prejudice with discrimination

# 11.6:  Interpersonal Attraction

**Objective:**  Describe the four powerful sources of reward that predict interpersonal attraction

It is no surprise that we are attracted to people who have something to offer us (Brehm and others, 2002; Simpson & Harris, 1994). We tend to like those who give us gifts, agree with us, act friendly toward us, share our interests, entertain us, and help us in times of need—unless, of course, we suspect that their behavior is self-serving or hypocritical. Although we don't necessarily mind giving something back in the form of a social exchange, we shrink from relationships that merely take from us and offer nothing in return. In the best of relationships, as in a friendship, partnership, marriage, or business relationship, both parties receive rewards. You might consider whether this is true in your own relationships as we look at the reward theory of attraction next.

## 11.6.1:  Reward Theory: We (Usually) Prefer Rewarding Relationships

Like it or not, most good relationships can be seen as an exchange of benefits (Batson, 1987; Clark and others, 1989). The benefits could be some combination of money and material possessions. Or the exchange might involve something intangible like praise, status, information, sex, or emotional support.

Social psychologist Elliot Aronson (2004) summarizes this in a **reward theory of attraction**, which says that attraction is a form of social learning. By looking at the social costs and benefits, claims Aronson, we can usually understand why people are attracted to each other. In brief, reward theory says that we like best those who give us maximum rewards at minimum cost. After we look at the evidence, we think you will agree that this theory explains (almost) everything about interpersonal attraction. Social psychologists have found four especially powerful sources of reward that predict interpersonal attraction: proximity, similarity, self-disclosure, and physical attractiveness (see Figure 11.7). Most of us choose our friends, associates, and lovers because they offer some combination of these factors at a relatively low social cost.

**Figure 11.7**  The Four Sources of Rewards in the Reward Theory of Attraction

Our attraction to others is based on similarity to us, attractiveness, proximity, and shared self-disclosures.



## 11.6.2:  Proximity

An old saying advises, "Absence makes the heart grow fonder." Another contradicts with "Out of sight, out of mind." Which one is correct? Studies show that frequent sightings best predict our closest relationships, and the people we see most often are the people who live and work nearest us (Simpson & Harris, 1994). In college dormitories, residents more often become close friends with the person who lives in the next room than they do with the person who lives two doors down (Priest & Sawyer, 1967). Residents of apartments make more friendships among people who live on the same floor than among those who live on other floors (Nahemow & Lawton, 1975). Those who live in neighborhoods more often become friends with the occupants of the house next door than with people living two houses away (Festinger and others, 1950). This **principle of proximity** (nearness) also accounts for the fact that many people end up married to the boy or girl next door (Ineichen, 1979). And it correctly predicts that people at work will make more friends among those with whom they have the most contact (Segal, 1974).

Although you don't have to like your neighbors, the proximity rule says that when two individuals are equally attractive, you are more likely to make friends with the nearest one: The rewards are equal, but the cost is less in

terms of time and inconvenience (Gilbertson and others, 1998). Apparently, another old saying, that familiarity breeds contempt, should be revised in light of social psychological research: In fact, familiarity more often breeds friendship. Increased contact, itself, often increases people's liking for each other (Bornstein, 1989).

## 11.6.3: Similarity

Do birds of a feather flock together, or do opposites attract? Which of these proverbs has the best research evidence to support it? People usually find it more rewarding to strike up a friendship with someone who shares their attitudes, interests, values, and experiences than to bother with people who are disagreeable or merely different (Montoya & Horton, 2013; Simpson & Harris, 1994). If two people have just discovered that they share tastes in music, politics, and attitudes toward education, they will probably hit it off because they have, in effect, exchanged compliments that reward each other for their tastes and attitudes (Byrne, 1969). The **similarity principle** also explains why teenagers are most likely to make friends among those who share their political and religious views, educational aspirations, and attitudes toward music, alcohol, and drugs (Kandel, 1978). Likewise, similarity accounts for the fact that most people find marriage partners of the same age, race, social status, attitudes, and values (Brehm, 1992; Hendrick & Hendrick, 1992). In general, similarity, like proximity, makes the hearts grow fonder. However, it is also true that over time, couples can also experience attitude realignment, as each of them gradually shifts views on various issues to be more closely aligned to those of their partner (Davis & Rusbult, 2001).

## 11.6.4: Self-Disclosure

Good friends and lovers share intimate details about themselves (Sternberg, 1998). This practice of **self-disclosure** not only allows people to know each other more deeply, but it also sends signals of trust. It is as if I say, "Here is a piece of information that I want you to know about me, and I trust you not to hurt me with it." Friends and lovers usually find such exchanges highly rewarding. When you observe people exchanging confidences and details about their lives, you can predict that they are becoming more and more attracted to each other. Given that sharing personal disclosures comes after a sense of trust has been created in a relationship, it both takes time to reach this level of intimacy and is an index of the trust the disclosing person has in the other. See Figure 11.8. Think about the people with whom you share secrets and those you never would. What underlies these acts of sharing or withholding secrets? The very act of telling someone that you want to share a secret with them automatically confers on them a special status in the relationship, since secrets are by definition private and rare events.

**Figure 11.8** Levels of Self-Disclosure

Social penetration theory suggests that, as we get to know someone better, our levels of self-disclosure deepen. When first meeting someone, we might disclose at level 1 or 2, but rarely do we share our deep fears or desires early on.



1: Biographical Data (Age, Gender, Name)

2: Preference in Clothes, food & Music

3: Goals, Aspirations

4: Religious Convictions

5: Deeply Held Fears & Fantasies

6: Self-concept

## 11.6.5: Physical Attractiveness

Yet another old saying tells us that beauty is only skin deep. Nevertheless, people usually find it more rewarding to associate with people they consider physically attractive than with those they consider to be plain or homely (Poulsen and others, 2013; Patzer, 1985). Fair or not, good looks are a real social asset. Potential employers, for example, prefer good-looking job candidates to plainer applicants, and physically attractive people enjoy more success in their jobs as well (Hosoda and others, 2003; Cash & Janda, 1984). Looks also affect people's judgments of children. Attractive children are judged as happier and more competent than their peers (Eagly and others, 1991). Even babies judge people by their appearances. We know this because babies gaze longer at pictures of normal faces than at those of distorted faces (Langlois and others, 1987).

Most people are repelled by the idea that they might make judgments based only on looks. Indeed, when asked what they look for in a dating partner, college students rank physical attractiveness down toward the middle of the list. But what people say does not match what they do—at least as far as their first impressions go. Across many studies involving a variety of characteristics, including intelligence, sincerity, masculinity, femininity, and independence, it was *physical attractiveness* that overwhelmed everything else as the best predictor of how well a person would be liked after a first meeting (Aronson, 2004).

Other research shows that the principle of attractiveness applies equally to same-sex and opposite-sex

relationships (Maruyama & Miller, 1975). Gender differences do exist, however. While both males and females are strongly influenced by physical attractiveness, men seem to be more influenced by looks than are women (Feingold, 1990).

These findings may come as bad news for the majority of us, who consider ourselves rather average-looking at best. But we can take some comfort in a study that suggests that people actually consider a composite of "average" features to be the most attractive. Investigators fed images of many students' faces into a computer program that manipulated the facial features to be more or less of an average combination of all features from the many different student portraits. Surprisingly, they found that people usually liked best the images having features closest to the average size and shape (Rhodes and others, 1999).

Now some bad news for you exceptionally attractive readers: While we usually associate positive qualities with attractive individuals (Calvert, 1988), extreme attractiveness can also be a liability. Physically attractive people are seen as more poised, interesting, sociable, independent, exciting, sexual, intelligent, well adjusted, and successful, but they are also perceived as more vain and materialistic (Hassebrauck, 1988). A "double standard" also comes into play: For example, the public favors good-looking male politicians but disparages their attractive female counterparts (Sigelman and others, 1986). It is also double trouble to be shy if you are also handsome or beautiful, because others mistake attractive people with a reserved demeanor as being cold, indifferent, or feeling superior.

These effects of physical attractiveness hint that reward, as powerful as it is, does not account for everything. We will see this more clearly in the next section, as we explore some important exceptions to the reward theory of attraction.

## 11.6.6: Exceptions to the Reward Theory of Attraction

While the rules of proximity, similarity, self-disclosure, and physical attractiveness may explain a lot about interpersonal attraction, a casual look around reveals lots of relationships that don't seem especially rewarding. Why, for example, might a woman be attracted to a man who abuses her? Or why would a person want to join an organization that requires a difficult or degrading initiation ritual? Such relationships pose most interesting puzzles (Aronson, 2004). Could some people actually feel more attraction when they find that another person has less to offer them? Let's try to uncover the principles of social cognition operating behind some interesting exceptions to a reward theory of attraction.

**EXPECTATIONS AND THE INFLUENCE OF SELF-ESTEEM**
We have seen that reward theory predicts our attraction to good-looking people—and, to a lesser degree, those who are nearby, smart, self-disclosing, like-minded, and powerful. Yet you have probably observed that most people end up with friends and mates whom they judge to be of about their same level of overall desirability—the so-called **matching hypothesis** (Feingold, 1988; Harvey & Pauwels, 1999). How does this happen?

**Is our selection of associates the result of a sort of bargaining for the best we can get in the interpersonal marketplace? What do you think?**

Yes, says **expectancy-value theory**. People usually decide whether to pursue a relationship by weighing the value they see in another person (including such qualities as physical attractiveness, wit, interests, and intelligence) against their expectation of success in the relationship (Will the other person be attracted to me?). Most of us don't waste time on trying to connect with others who either seem "too good"—or "not good enough"—for what we think of our important attributes and values. We tend to seek a match that is harmonious with our self-definition, assuming it is reality based. Thus, we initiate relationships with the most attractive people we think will probably like us in return. In this sense, expectancy-value theory is not so much a competitor of reward theory as it is a refinement of it.



The matching hypothesis indicates that we seek out a romantic partner who is similar to our own level of physical attractiveness, as long as the self-worth and popularity of the individuals are also relatively equal.

A new look at the matching hypothesis, however, took advantage of a popular online dating site and also laboratory studies to show that the matching hypothesis is more complicated than psychologists had thought (Taylor and others, 2011). Unexpectedly, physical attractiveness, by itself, was not a good predictor in these studies. Rather, the research showed that two more global factors need to be taken into account: *self-worth* (what people think of themselves) and *social desirability* (popularity). In general, participants in these online experiments tended to initiate contacts with those having similar self-worth and social desirability.

And what happened when they ventured "out of their league?" Men, more so than women, were successful in initiating contacts with persons rated at or above their own social desirability level. But woe to those who sought to play "out of their league" in physical attractiveness: More often than not, they were ignored when they initiated contacts with those (independently judged to be) more physically attractive than themselves.

Other research shows that people with low opinions of themselves tend to establish relationships with people who share their views, often with people who devalue them. Not surprisingly, this can lead to dysfunctional relationships. Such individuals may actually feel a stronger commitment to a relationship when their partner thinks poorly of them than they do when the partner thinks well of them (Swann and others, 1992).

Similarly, those individuals who appear to be *extremely* competent can also be losers in the expectancy-value game. Why? Most of us keep such people at a distance, probably because we fear that they will be quick to reject our approaches. But, if you happen to be one of these stunningly superior people, do not despair: Social psychologists have found hope! When highly competent individuals commit minor blunders—spilling a drink or dropping a stack of papers—other people actually like them better, probably because blunders bring them down to everyone else's level and "normalize" them (Aronson and others, 1966, 1970). Don't count on this, however, unless you are so awesomely competent as to be unapproachable. The latté-in-the-lap trick only makes most of us look like klutzes, whom people actually like *less.*

**ATTRACTION AND DISSONANCE**    *Semper fidelis,* says the Marine Corps motto: "Always faithful." Considering the discomforting experiences that people must endure to become Marines (grueling physical conditioning, loss of sleep, lack of privacy, being yelled at, suffering punishment for small infractions of rules), it may seem remarkable that recruits routinely develop so much loyalty to their organization. The same is true of more enduring loyalty to fraternities that practice hazing compared to college house plans that do not. Obviously, some powerfully attractive and interesting forces are at work.

**Cognitive dissonance theory** offers a compelling explanation for the mental adjustments that occur in people who voluntarily undergo unpleasant experiences (Festinger, 1957). The theory says that when people voluntarily act in ways that produce *psychological* discomfort or otherwise clash with their attitudes and values, they develop a highly motivating mental state called *cognitive dissonance.* Those who continue to smoke yet know the negative (lethal health) consequences of cigarette addiction experience dissonance, as do gamblers

who continually lose but keep playing. The same holds true for people who find they are acting in ways that cause them to experience physical or emotional discomfort. Thus, our Marine recruits may feel cognitive dissonance when they find that they have volunteered for an experience that is far more punishing than they had imagined from the recruiting ads. And what is the psychological result?

According to cognitive dissonance theory, people are motivated to avoid the uncomfortable state of dissonance. If they find themselves experiencing cognitive dissonance, they attempt to reduce it in ways that are predictable, even if not always entirely logical. The two main ways of reducing dissonance are to change either one's behavior or one's cognitions. So, in civilian life, if the boss is abusive, you might avoid dissonance by simply finding another job. But in the case of a Marine recruit, changing jobs is not an option: It is too late to turn back once basic training has started. A recruit experiencing cognitive dissonance, therefore, is motivated to adjust his or her thinking. Most likely, the recruit will resolve the dissonance by rationalizing the experience ("It's tough, but it builds character!") and by developing a stronger loyalty to the organization ("Being a member of such an elite group is worth all the suffering!"). Either way, the dissonance will be reduced, and the individual will feel better.

It is, in fact, the latter solution that occurs more often: when people's cognitions and actions are in conflict (a state of *dissonance*), they often reduce the conflict by changing their thinking, their attitudes and values, to fit their behavior (rather than the other way around). Why? People don't like to see themselves as being foolish or inconsistent So, to explain their own behavior to themselves, people are motivated to change their attitudes, which are private, rather than their overt behavior, which is public. To do otherwise would threaten their self-esteem.

One cultural variation on this theory has recently come to light. In Japan and other parts of Asia, studies show that people have a lesser need to maintain high self-esteem than do North Americans (Bower, 1997a; Heine and others, 1999; Hoshino-Browne, 2012). As a result, cognitive dissonance was found to have less power to change attitudes among Japanese. Apparently, cognitive dissonance is yet another psychological process that operates differently in collectivist and individualistic cultures.

**THE EXPLANATORY POWER OF DISSONANCE** Despite cultural variations, cognitive dissonance theory explains many things that people do to justify their behavior and thereby avoid dissonance. For example, it explains why smokers so often rationalize their habit. It explains why people who have put their efforts into a

project, whether it be volunteering for the Red Cross or writing a letter of recommendation, become more committed to the cause as time goes on—to justify their effort. It also explains why, if you have just decided to buy a Honda car, you will attend to new information supporting your choice (such as Honda commercials on TV), but you will tend to ignore dissonance-producing information (such as its higher price, or its massive recall for faulty acceleration).

Cognitive dissonance theory also helps us understand certain puzzling social relationships, such as a woman who is attracted to a man who abuses her. Her dissonance might be summed up in this thought: "Why am I staying with someone who hurts me?" Her powerful drive for self-justification may make her reduce the dissonance by focusing on his good points and minimizing the abuse. And, if she has low self-esteem, she may also tell herself that she deserved his abuse.

To put the matter in more general terms: Cognitive dissonance theory predicts that people are attracted to those for whom they believe they have suffered voluntarily. A general reward theory, by contrast, would never have predicted that outcome. Another vital contribution made by dissonance theorists provides a theoretical framework for understanding why we all come to justify our foolish beliefs, bad decisions, and even hurtful acts against others—by justification and disowning personal responsibility for dissonance-generating decisions (Tavris & Aronson, 2007).

Because we are *rationalizing* creatures as much as we are *rational* ones, we endlessly justify our decisions and behavior to make them appear reasonable by generating "good reasons" for our bad behaviors (Tavris & Aronson, 2007). The good news? This faulty thinking pattern can be easily short-circuited. All you have to do is to say: "I'm sorry. I made a mistake, it won't happen again, forgive me."

To sum up our discussion on interpersonal attraction: You will not usually go far wrong if you use a **reward theory** to understand why people are attracted to each other. People initiate social relationships because they expect some sort of benefit. It may be an outright reward, such as money or status or sex, or it may be an avoidance of some feared consequence, such as pain of social isolation or social rejection.

But social psychology also shows that a simple reward theory cannot, by itself, account for all the subtlety of human social interaction. A more sophisticated and useful understanding of attraction must take into account such cognitive factors as expectations, self-esteem, and cognitive dissonance; that is, a complete theory must take into account the ways that we interpret, or construct, our social environment. This notion of subjective interpretation also underlies other judgments that we make about people: those we love and those we hate.

# 11.7:  Loving Relationships

**Objective:**  Review the three components of the triangular theory of love

Although people sometimes do terrible things to one another, the complexity and beauty of the human mind also enable people to be caring and loving. Liking and loving are essential for happiness (Kim & Hatfield, 2004). Further, the pleasures of attraction and love appear to be part of the very circuitry and chemistry of our brains (Bartels & Zeki, 2004).

How do we know when attraction becomes love? To a large extent, our culture tells us how. Each culture has certain common themes defining love—such as sexual arousal, attachment, concern for the other's welfare, and a willingness to make a commitment. But the idea of "love" can vary greatly from culture to culture (Sternberg, 1998).

There are also many kinds of love. The love that a parent has for a child differs from the love that longtime friends have for each other. Both differ from the commitment found, say, in a loving couple that has been married for 40 years. Yet, for many Americans, the term *love* brings to mind yet another form of attraction based on infatuation and sexual desire: **romantic love**, a temporary and highly emotional condition that generally fades after a few months (Hatfield and others, 1995; Hatfield & Rapson, 1998). But the American assumption that romantic love is the basis for a long-term intimate commitment is not universal. In many other cultures, marriage is seen as an economic bond or, perhaps, as a political relationship linking families. Indeed, a variety of cultures still promote "arranged marriages" where parents or even grandparents decide on the best match for the son or daughter that will enhance the status of the family in power or finances.

Psychologist Robert Sternberg (1998) has proposed an interesting view in his **triangular theory of love**. See Figure 11.9. He says that love can have three components:

1. Passion (erotic attraction)
2. Intimacy (sharing feelings and confidences)
3. Commitment (dedication to putting this relationship first in one's life)

Various forms of love can be understood in terms of different combinations of these three components. Thus, Sternberg suggests that:

- *Romantic love* is high in passion and intimacy but low in commitment.
- *Liking* and *friendship* are characterized by intimacy, but not by passion or commitment.
- *Infatuation* has a high level of passion, but has not developed into intimacy or a committed relationship.

---

**Figure 11.9** Sternberg's Model

Love can come in four different types, according to Sternberg.



- *Complete love* (consummate love) involves all three: passion, intimacy, and commitment.
- *Companionate love* often follows the consummate kind with a dimming of the passion but often with greater intimacy and commitment.

The need to understand what strengthens and weakens loving relationships in our own culture has acquired some urgency because of the "divorce epidemic" in the United States (Brehm, 1992; Harvey & Pauwels, 1999). If current rates hold, approximately half of all today's first marriages—and up to 60% of second marriages—will end in divorce. Much research stimulated by concern about high divorce rates has focused on the effects of divorce on children (Ahrons, 1994). The negative effects are lessened when the divorce is amicable and former spouses coparent and do not denigrate each other to the children. Sometimes removing children from a conflict-ridden family setting, or one with an abusive parent, is clearly better for them.

What are the processes by which couples maintain loving relationships, and what environments challenge relationships? We have already shown that, for a relationship to stay healthy and to thrive, both partners must see it as rewarding and equitable. As we saw in our discussion of reward theory, both must, over the long run, feel that they are getting something out of the relationship, not just giving. What they get—the rewards of the relationship—can involve many things, including adventure, status, laughter, mental stimulation, and material goods, as well as nurturance, love, and social support (Berscheid, 1999).

In addition, for a relationship to thrive, communication between partners must be open, ongoing, and mutually validating (Monaghan, 1999). Research shows that couples in lasting relationships have five times more positive interactions than negative ones—including exchanges of smiles, loving touches, laughter, and compliments (Gottman, 1994). Yet, because every relationship experiences an occasional communication breakdown, the partners must know how to deal with conflicts effectively. Conflicts must be faced early and resolved fairly and effectively. Ultimately, each partner must take responsibility for his or her own identity, self-esteem, and commitment to the relationship—rather than expect the partner to engage in mind reading or self-sacrifice.

This has been the briefest sampling from the growing social psychology of relationships. Such research has practical applications. Teachers familiar with research findings can now inform their students about the basic principles of healthy relationships. Therapists apply these principles in advising clients on how to communicate with partners, negotiate the terms of their relationships, and resolve inevitable conflicts. More immediately, as you yourself learn about the factors that influence how you perceive and relate to others, you should gain a greater sense of self-control and well-being in your own intimate connections with others (Harvey, 1996; Harvey and others, 1990).

## 11.7.1:  Long-Term Romantic Love

For too many couples who were initially hot for each other in romantic, passionate love, they've "lost that lovin' feeling." However, we can be encouraged by new research revealing that couples in long-term romantic love relationships can keep the flame burning hot, at least in their brains (Acevedo and others, 2011). Individual men and women who had been in such relationships for more than 20 years had their brains scanned in fMRI procedures under two different conditions. They viewed facial images of their partner, as well as comparison images of highly familiar acquaintances, close, long-term friends, or someone not familiar. When they saw pictures of their partner's face, their brains "lit up" in areas associated with the dopamine-rich reward and basal ganglia system—similar to activation in new love. Moreover, these long-term lovers showed activation in brain regions associated with maternal attachment and pair bonding. These effects were specific only to their intensely loved, long-term partner; for other images, their brain patterns were random.

# 11.8:  Making Cognitive Attributions

**Objective:**  **Evaluate the dual tendency to overemphasize personal traits while minimizing situational influences**

We are always trying to explain to ourselves why people do what they do. Suppose you are riding on a bus when a middle-aged woman with an armload of packages gets on. In the process of finding a seat, she drops everything on the floor as the bus starts up. How do you explain her behavior? Do you think of her as the victim of circumstances, or is she incompetent or eliciting sympathy so someone will give up a seat to her?

Social psychologists have found that we tend to attribute other people's actions and misfortunes to their personal traits rather than to situational forces, such as the unpredictable lurching of the bus. This helps explain why we often hear attributions of laziness or low intelligence to the poor or homeless rather than an externally imposed lack of opportunity (Zucker & Weiner, 1993).

On the other side of the attributional coin, we find that people use the same process to explain each other's successes. So you may ascribe the success of a favorite singer, athlete, or family member to personal traits, such as exceptional talent or intense motivation. In doing so, we tend to ignore the effects of situational forces, such as the influence of family, coaches, a marketing blitz, long hours of practice, sacrifices, or just a "lucky break."

## 11.8.1:  The Fundamental Attribution Error

Psychologists refer to the **fundamental attribution error (FAE)** as the dual tendency to overemphasize personal traits (the rush to the dispositional) while minimizing situational influences. The FAE is not always an "error," of course. If the causes really are dispositional, the observer's guess is correct. So the FAE is best thought of as a *bias* rather than a mistake. However, the FAE is an error in the sense that an observer may overlook legitimate, situational explanations for another's actions. For example, if the car in front of you brakes suddenly so that you almost collide, your first impression may be that the other driver is at fault, a dispositional judgment. But what if the driver slowed down to avoid hitting a dog that ran into the road? Then the explanation for the near-accident would be situational, not dispositional. By reminding ourselves that circumstances may account for seemingly inexplicable actions, we are less likely to commit the FAE. As a general principle, we encourage you to practice "*attributional charity*," which involves always trying first to find a situational explanation for strange or unusual behavior of others before blaming them with dispositional explanations. Blame the situation before rushing to blame the person. It can help you to change the situation for the better as well as avoid hurting the feelings of a friend or associate.

Despite its name, however, the fundamental attribution error is not as fundamental as psychologists at first thought. Cross-cultural research has suggested that it is more pervasive in individualistic cultures, as found in the United States or Canada, than in collectivist cultures, as found in Japan or China (Norenzayan & Nisbett, 2000). Even within the United States, urban children are more susceptible to the fundamental attribution error than are their country cousins (Lillard, 1999). Why do you think this is so?

**The Fundamental Attribution Error in Your Life**

When have you made the FAE? Why does culture influence this tendency, and why are city folks more susceptible to the FAE?

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

## 11.8.2: Biased Thinking About Yourself

Oddly, you probably judge yourself by two different standards, depending on whether you experience success or failure. When things go well, most people attribute their own success to internal factors, such as motivation, talent, or skill ("I am good at taking multiple-choice tests"). But when things go poorly, they attribute failure to external factors beyond their control ("The professor asked trick questions;" Smith & Ellsworth, 1987). Psychologists have dubbed this tendency the **self-serving bias** (Bradley, 1978; Fletcher & Ward, 1988). Self-serving biases are probably rooted in the need for self-esteem, a preference for interpretations that save face and cast our actions in the best possible light—both to ourselves and to others (Schlenker and others, 1990).

Social pressures to excel as an individual make the self-serving bias, like the fundamental attribution error, more common in individualist cultures than in collectivist cultures (Markus & Kitayama, 1994). In addition, when trying to understand the behavior of others, we tend often to use dispositional explanations, finding things "in them" that might explain why they did this or that. However, when we are trying to figure out the reasons for our own actions, we tend to look to the situational factors acting on us, because we are more aware of them than in our judgments of others. If you believed that you would have defied the authority in the Milgram study and quit long before the 450-volt shock level, despite the evidence that the majority went all the way, a self-serving bias was at work to make you think of yourself as able to resist situational forces that overwhelmed others.

## 11.8.3: Universal Dimensions of Social Cognition: Warmth and Competence

Among the most basic social perceptions anyone makes are those of "others" as friend or foe, intending to do us good or ill, and able to enact those intentions or not. A large body of new research has established that perceived liking and respecting of others are the two universal dimensions of human social cognition, at both individual and group levels. People in all cultures differentiate each other by *liking* (assessed as warmth and trustworthiness) and by *respecting* (assessed as competence and efficiency). The warmth dimension is captured in traits that are related to perceived intent, including friendliness, helpfulness, sincerity, trustworthiness, and morality. By contrast, the competence dimension reflects those traits that are related to perceived ability, intelligence, skill, creativity, and efficacy (Fiske and others, 2007).

When these two dimensions are plotted on a graph, as in Figure 11.10, we see that four quadrants emerge: I. high

**Figure 11.10** The Dimensions of Warmth and Competence

The dimensions of warmth and competence generate four quadrants of different actions and emotions toward others.

warmth and low competence; II. high warmth and high competence; III. low warmth and low competence; and IV. low warmth and high competence. A large body of research reveals distinct emotions and behaviors associated with each of the social perceptions typical of the four quadrants (Fiske and others, 2007).

Those who are perceived to be high in warmth fall into quadrants I and II. But, as you will see, even though we are drawn to those in both groups because of their perceived warmth, we react to them quite differently depending on how we perceive their competence. For people that we view as fitting in quadrant I, we tend to feel pity and may actively seek to help them. (People frequently perceive the elderly and those with disabilities as falling into quadrant I.) The added perception of competence, however, produces quadrant II, containing those we like or admire—and with whom we want to associate. (This quadrant includes those with whom we identify or aspire to associate—perhaps pastors or rabbis, movie stars, sports heroes, Bill Gates of Microsoft, or Mark Zuckerberg, founder of Facebook.)

Now consider how we react to those we perceive as low in warmth. For those we pigeonhole in quadrant III—whom we perceive as being low in both warmth and competence—we feel disdain and a desire to avoid, ignore, or neglect them. (For many people, these would include members of some minority groups or welfare recipients.) But our most negative feelings are reserved for those we place in quadrant IV: people whom we perceive as privileged but somehow undeserving. For most of us, the occupants of quadrant IV provoke feelings of envy and the wish to "bring them down a notch or two"—perhaps even the desire to cause them harm. (Common examples might include politicians, lawyers, and the very rich.)

The authors of this research argue that group-based prejudices and stereotypes appear high on one of these two dimensions and low on the other, thereby creating ambivalent feelings and volatile behavior that can endanger constructive intergroup relationships.

## 11.8.4: Cross-Cultural Research on the Need for Positive Self-Regard

It is important to consider two rather profound questions about the self in relationship to others:

- *Is it true that all people seek positive self-regard? In other words, are all people motivated to possess, enhance, and maintain a positive self-concept?*
- *Is this a basic attribute of humankind?*

It would seem so if we consider what people around us do to enhance their self-esteem, the efforts made to be special, even through self-serving biases and personal affirmations. If we look around in North America, the answer might be different than if we look around in Japan.

Researchers have carefully examined both cultural contexts to identify how cultural norms and institutions can promote and sustain the mentalities associated with self-regard. They have found that many aspects of life in North America lead both to an excessive focus on the self as an individual entity and to encouraging motivation to regard one's self in positive ways, as special, unique, and entitled. This can be seen in ads, movies, songs, diaries, and many aspects of contemporary American culture. By contrast, what is more typical in Japanese culture is the development of a self-critical focus. Personal evaluation usually begins with a critique of the individual's performance or even lifestyle. That critical orientation is both self-effacing and humbling, thereby minimizing any tendency toward arrogance. However, its goal is to seek ways to improve one's attitudes and behaviors in constructive fashion, which satisfies both the individual's needs and those of the family, team, business, and the larger community. Such research is important in qualifying what appear to be universal aspects of human nature, yet are actually culturally specific (Heine and others, 1999).



Can you think of at least three factors discussed so far in this chapter that might be motivating the helping behavior shown in this situation?

# 11.9: Prejudice and Discrimination

**Objective:** **Compare prejudice with discrimination**

While our attributions about others can be positive or negative, **prejudice** (as social psychologists use the term) always involves a negative judgment held about other people. Prejudice can make an employer discriminate against women (or men) for a management job. It can make a teacher expect poor work from a minority student. And, in some places in the world, it has led to **genocide**, the systematic extermination of a group of people because of their racial or ethnic origins. We will define prejudice as negative attitudes, beliefs, and feelings toward an individual based solely on his or her membership in a particular group or category.

That category may be real, like gender or ethnicity, but it can also be created in the mind of the prejudiced person, such as considering some people as "poor white trash," or others as "left-wing liberals." Even more common prejudices are about the positive nature of tall men, as more talented, better educated, better leaders, and richer than shorter men. The same goes for positive biases about women who are prettier than average as better on many dimensions. Prejudice may be expressed as negative emotions (such as dislike or fear), negative attributions or stereotypes that justify the attitude, and/or attempts to avoid, control, dominate, or eliminate those in the target group. Prejudiced attitudes serve as extreme biasing filters that influence the way others are perceived and treated. Thus, prejudice exerts a powerful force for selectively processing, organizing, and remembering pertinent information about particular people. It is also pervasive; most people in most nations harbor prejudices of varying kinds, some conscious and some nonconscious (as new research is uncovering, to be treated later in this section).

Let's distinguish prejudice from **discrimination**, a related concept. While prejudice is an attitude, discrimination is a behavior. Discrimination can be defined as a negative action taken against an individual because of his or her membership in a given group. Racial profiling, for example, is often considered a discriminatory procedure because it singles out individual people based solely on racial features. It can result in more arrests of minority members because police are more likely to confront them than majority members for their "suspicious behavior." But, while discrimination can arise from prejudice, we will see soon that this is not always the case. In this section, we will review the causes of prejudice, the role of **dehumanization** as a basic process in prejudice, and combating prejudice, and we will end with new research on **stereotype threat**.

## 11.9.1: Causes of Prejudice

Prejudices can emerge from many sources (Allport, 1954; Aronson, 2004). Some we acquire at an early age. Some are defensive reactions when we feel threatened. Some are the result of conformity to social customs. And some help us distinguish strangers (and possible foes) from friends (Whitley, 1999). An understanding of these sources of prejudice will provide us with the foundation necessary for thinking about possible "cures," ways to combat these antisocial reactions. Here, we present five causes of prejudice that have been studied by social psychologists:

1. Dissimilarity and social distance
2. Economic competition
3. Scapegoating
4. Conformity to social norms
5. Media stereotyping

**DISSIMILARITY AND SOCIAL DISTANCE** If similarity breeds liking, then *dissimilarity* can breed disdain—and prejudice. So, if you wear T-shirts with sexy or vulgar slogans, flaming red- or blue-dyed hair, or have extensive body piercings or tattoos, it's a good bet that some middle-aged people from a traditional background might feel uncomfortable around you. They are likely to perceive you as a part of a social group that flaunts values and encourages "radical" behaviors quite distinct from those of their own group. Even perceived small differences in appearance can easily become fertile ground for the growth of prejudice.



**Mom, guess who is coming to dinner?** Would your mother be pleased if you invited this teen to dinner in your home? If not, would that be her prejudice based solely on external appearance?

What psychological principles are at work? When you perceive someone to be unlike the people in your in-group, you mentally place that person at a greater **social distance** than members of your own group. You are then less likely to view that individual as a social equal (Turner & Oakes, 1989). This inequality easily translates into inferiority, making it easier for you to treat members of an out-group with contempt. Historically, more powerful groups have discriminated against out-groups by withholding privileges, sending members of out-groups to different schools, making them sit in the back of the bus, forcing them into low-wage jobs, sending them to jail and into restrictive neighborhood ghettos, and otherwise violating their personal dignity. Age differences, skin color, ethnicity, customs, religion, political views, social and economic status, and even food preferences are just some of the bases on which people categorize others and feel social distance when they are different from one's own.

**ECONOMIC COMPETITION**   A second cause of prejudice occurs in highly competitive situations, where one group threatens (i.e., not just *wins*) economic benefits or jobs at the other group's expense, which can easily fan the flames of prejudice. For example, in the Pacific Northwest, where competition over old-growth forests threatens jobs and wildlife habitat, prejudice sets timber workers and environmentalists against each other. Likewise, surveys have found, for example, prejudice against Black Americans to be greatest among White groups poised at an economic level just above the Black American average—precisely the ones who would feel their jobs most threatened by Black Americans (Greeley & Sheatsley, 1971). It is often true that much prejudice exists not only down from those in privileged positions to those in minority positions but across minority groups, between recent immigrants from different countries, or when new immigrants threaten the financial security of established minorities.

This was the case in New York City's South Bronx area when, after World War II, thousands of Puerto Ricans emigrated to that neighborhood (after a massive sugar crop failure and given free government airfare to the United States). They competed with Blacks living there and others coming back from war service for housing and low-level jobs. Researchers discovered high levels of antagonism and prejudice between these two minority groups, each struggling "to make it" in America and also coping with top-down prejudice against both of them by the majority White population (Zimbardo, 1953). The play and movie *West Side Story* is an updating of the tragic love story of *Romeo and Juliet*, replacing Italian family hostilities with Puerto Rican and White teen gang warfare.

**SCAPEGOATING**   To understand a third cause of prejudice, consider how the Hebrew priests of olden times performed a ritual that symbolically transferred the sins of the people to a goat—the scapegoat. The animal was then driven into the desert to carry its burden of guilt away from the community. The term *scapegoat* has been applied in modern times to an innocent person or group who receives blame when others feel threatened. On a large and horrifying scale, German Jews served as scapegoats for the Nazis in World War II. Hitler's propaganda program encouraged this by creating visual images of German Jews as totally different from the rest of the German population; such terrible images set them apart as the "faces of the enemy" (Keen, 1991).

Such visual propaganda, which most nations use as a prelude to going to war, first creates an enemy that is hated by the general populace and then feared enough to want to destroy them or have one's son kill them as part of the army. This mentality is called the "hostile imagination"

**Figure 11.11** Examples of the Killing Ground of Prejudice and Discrimination



All school children in Nazi Germany (1930s and 1940s) read textbooks describing Jews as inferior to the "Aryan race."



These comic book animations of Jewish inferiority and ruthlessness ended with images of Jews being kicked out of schools, placed into restricted housing, and deported. This type of propaganda was just one element of the successful Nazi attempt to create a culture of prejudice and discrimination.

that creates a psychology of enmity—of instilling hatred of the "Other." After the 911 attacks in New York City by terrorists from Saudi Arabia, Muslims who were lifelong American citizens were treated as enemy aliens by their neighbors in many towns. We are also witnessing a new, deeper level of such negativity around those with different political party affiliation in the United States, describing the other as if they were enemies of the state rather than with alternative views and agendas of Republicans and Democrats.

**Scapegoating** works most readily when the object of scorn is readily identifiable by skin color or some distinctive physical features or when media propaganda can create such differences in the minds of the dominant group (Sax, 2002). It also becomes more probable when conditions worsen in a neighborhood or a country and people are seeking to blame someone for that change from the good old days to bad times.

**CONFORMITY TO SOCIAL NORMS**   The source of discrimination and prejudice that is perhaps the most pervasive is an unthinking tendency to maintain conditions the way they are, even when those conditions involve unfair assumptions, prejudices, and customs. For example, in many offices, it is the norm for secretaries to be female and executives to be male. Only 18% of private corporations have women on their boards in the United States. That low percentage drops to 2% in Italy and less than 1% in Japan in 2008. In Arab nations, it would be even more rare to have any women in such positions unless they were relatives of the top executives. Because of this norm, it may be difficult for highly qualified women to break into the executive ranks, to breach the "glass ceiling" above them. We may find the same process where the norm says that nurses and lab technicians should be females and engineers and mathematicians should be males. When we see that most people in a given profession are of a particular gender or race, we assume that is the way of the world, the way the social order meant it to be, rather than considering the social and economic conditions that have made it that way. So when women note that most computer programmers are males, they are likely to avoid taking computer science courses or going into such careers, which then become for "men only." The opposite is now true in psychology. The majority of students taking psychology courses, majoring in it, and going on in psychology careers are now women, a major gender reversal in the past decade. As our field becomes identified as "women only," some psychologists worry that males will be even less likely to enter it, and salaries for all will decrease.

There is some encouraging news of ongoing social trends to change these social norms regarding gender-based occupations. Examples include the promotion of women and minorities in the STEM sciences; the 30% club in the U.S. wherein companies voluntarily commit to having 30% of their board members women; and the 40% goal of Norway and some other European countries for greater diversity. These efforts work slowly, but best when they have legal, political, and economic supporters in order to back such massive systemic changes.

**MEDIA STEREOTYPES**   Our fifth cause of prejudice occurs when stereotyped images used to depict groups of people in film, in print, and on television reinforce prejudicial social norms. Such images are far from harmless, because people have learned many of their prejudices from the stereotypes they saw on TV and in books, movies, and magazines (Greenberg, 1986). On the other hand, images in the media can also change those norms. Until the Black Power movement gained media attention, Africans and African Americans were most often portrayed in movies and on TV as simple, slow, comic characters, perpetuating the "Sambo" image that many Whites held.

Fortunately, the most blatant racial stereotypes have disappeared from the national media in the past few decades. Media distortions still occur, of course, but they are subtler. Prime time TV features three times as many male as female characters (Aronson, 2004). Most are shown in professional and managerial positions, even though two-thirds of the U.S. workforce is employed in blue-collar and service jobs. The proportion of non-Whites and older persons who appear on TV is also much smaller than the general population. For viewers, the result is a biased picture of the world. This is where it becomes critical to have a variety of role models in the media that portray positions of influence and credibility to young people from those subgroups, such as women and ethnic/racial minority members as TV news anchors. The same is true of changes in stereotypes of those individuals who are now termed as LGBT (lesbian, gay, bisexual and transgender), as they are portrayed more frequently and in a variety of ordinary contexts.

**DEHUMANIZATION**   The most powerful psychological process underlying prejudice, discrimination, and intergroup violence is **dehumanization**. It works by causing some people to view others as less than human, even subhuman (see Figure 11.11). Dehumanization can be defined as a psychological process that biases perception and cognitions of others in ways that deprive them of their humanity, rendering them totally dissimilar and worthless. It is the mechanism behind thinking of particular disliked other people as objects, as the enemy, as animals and insects. Just as a cataract in the eye blurs one's vision, dehumanization is like a "cortical cataract" that blinds the mind to any perceived similarity between Us and Them. Thinking about

others as less than human means that one can suspend moral reasoning, empathy, compassion, and other processes that constrain hate and violence. It enables ordinary, even good, people to do bad, even evil deeds (Sherrer, 2008; Zimbardo, 2007).

A case in point of dehumanization in action occurred in 1994 in Rwanda, Africa. The Hutu government spread propaganda that the Tutsi people living there were the enemy of the Hutus; that they were insects, cockroaches, and had to be destroyed. Men armed with government-supplied machetes and women with clubs massacred 800,000 of their neighbors in 100 days (Hatzfeld, 2005). PBS created a powerful documentary of this dehumanization leading to genocide called *The Triumph of Evil*, and we have included a link to that website at the end of this chapter. Also recommended is the accurate presentation of this brutal conflict in the movie *Hotel Rwanda*.

Can such a complex psychological process be studied experimentally? Yes, indeed, and with a remarkably simple manipulation used by researcher Albert Bandura and his students (Bandura and others, 1975).

In an echo of Stanly Milgram's research, a small group of students from one college were supposed to be helping another group of students from a different local college to improve their decision-making skills. They were to provide standard problems to be solved collectively and then reward good solutions and punish bad ones. Punishment was via increasing levels of electric shock administered to the entire working group (no shocks were actually given; the participants only believed they were). The experimental manipulation consisted of the research assistant telling the experimenter that the students from the other school were ready to begin as the working group. Those who would do the shocking were randomly assigned to one of three conditions: Neutral, hearing only that the other students were ready; Dehumanizing, hearing that the other students seemed like "Animals," and Humanizing, hearing that the other students seemed like "Nice Guys." The results: Simply hearing a stranger label other college students as "Animals" was sufficient to induce the students in that condition to administer significantly more shock than in the Neutral condition, and increasingly more over the 10 trials. The good news: Humanizing others resulted in significantly less punishment than in the control condition, where students had no information about those others. So sticks and stones may break your bones, but bad names and dehumanization might kill you.

## 11.9.2: Combating Prejudice

During the civil rights struggles of the 1950s and 1960s, educators believed that prejudice could be overcome through a gradual process of information campaigns and education. But experience provided no encouragement for this hope.

In fact, these informational approaches are among the least effective tools for combating prejudice. The reason? **Selective exposure**! Our world is filled with an enormous amount of information on any issue, so sometimes we simplify the search algorithm by focusing only on what supports our views while ignoring contrary evidence which is selective exposure *in operation.* In general, prejudiced people (like everyone else) usually avoid information that conflicts with their view of the world, so they never watched or listened to those messages. Even for those who want to change their prejudiced attitudes, erasing the strong emotions and motivational foundations associated with long-standing prejudices is difficult with informational messages that are merely cognitively based (Devine & Zuwerink, 1994). The process is even more difficult for those who cherish their prejudices because their sense of self-worth is boosted by perceiving others as less worthy than them. Another way in which our usually reliable cognitive mind deceives us is when it pushes us toward adopting a **confirmation bias**.

> *This cognitive bias is a tendency to search out information or interpret available information in ways that confirm one's preconceptions.*

We discover what we had already believed to be true, so we are "right on"—but often mistakenly so. It is an error in inductive reasoning that creates statistical errors in analyzing human behavior.

So, how can one attack the prejudices of people who do not want to listen to another viewpoint? Research in social psychology suggests several possibilities. Among them are the use of new role models, equal status contact, and (surprisingly) new legislation at state and federal levels that mandates legally required actions in public places.

---

**WATCH** Responding to Racist Remarks



In this clip from the TV show *What Would You Do?* people find themselves in taxi cabs with a driver who is making racist remarks. How do you think most people respond?

**NEW ROLE MODELS**   Former Secretaries Of State Condoleezza Rice And Hillary Clinton, President Barack Obama, Supreme Court Justice Sonia Sotomayor, And Many Others Serve As New Role Models In Prestigious Jobs And Leadership Positions Where Few Of Their Race Or Gender Have Appeared Before.



President Barack Obama and Supreme Court Justice Sonia Sotomayor are role models for minority youth from Black and Hispanic communities.

Oregon's openly bisexual governor, Kate Brown, is a role model for people who identify as LGBT in the U.S. These role models encourage people in these groups who might never have otherwise considered such careers. What we do not know much about, however, is the ability of role models to change the minds of people who are already prejudiced. It is likely that they are perceived as "exceptions to the rule"; but, as the exceptions increase, maybe the rule bends or changes. Role models may serve better to prevent prejudice than to cure it.

**EQUAL STATUS CONTACT**   Slave owners always had plenty of contact with their slaves, but they always managed to hang onto their prejudices. Obviously, mere contact with people from an out-group is not enough to erase in-group prejudices against them. Evidence, however, from integrated public housing (where the economic threat of lowered property values is not an issue) suggests that when people are placed together under conditions of equal status, where neither wields power over the other, the chances of developing understanding increase (Deutsch & Collins, 1951; Wilner and others, 1955). In an extensive review of all available literature, Tom Pettigrew (1998) found strong support for the power of equal-status contact to prevent and reduce prejudice among many different kinds of groups.

**THE JIGSAW CLASSROOM**   Although we said earlier that educational approaches to dealing with prejudice proved overly optimistic, one approach has been spec-

tacularly successful. Social psychologist Elliott Aronson and his team showed that prejudice can be reduced in classrooms from grades 3 to 12 by substituting cooperative learning for the usual competitive style typical in traditional classrooms (Aronson, 1978, 1997). In Aronson's approach, the key is making each student an expert on one part of the lesson that all the other students in his or her group need for successful team performance. Every student becomes an integral part of the "jigsaw puzzle" that cannot be solved without his or her input. This strategy promotes active listening, group interaction, peer teaching, and enhanced appreciation of the value of students from minority groups who become equals in their knowledge of the new material that the rest of their team needs and comes to value. But how do we know that this approach actually reduces prejudice? Here is Aronson's response:

> Because we had randomly introduced the jigsaw intervention into some classrooms and not others, we were able to compare the progress of the jigsaw students with that of students in traditional classrooms. After only eight weeks there were clear differences, even though students spent only a small portion of their time in jigsaw groups. When tested objectively, jigsaw students expressed less prejudice and negative stereotyping, were more self-confident, and reported liking school better than children in traditional classrooms. Moreover, children in jigsaw classes were absent less often than were other students, and they showed greater academic improvement; poorer students in the jigsaw classroom scored significantly higher on objective exams than comparable students in traditional classes, while the good students continued to do as well as the good students in traditional classes. (Aronson, 1978, p. 257)

**LEGISLATION**   You can't legislate morality. Right? Wrong! One of the most convincing studies showing that the old cliché is wrong comes from an experiment done in the late 1940s, comparing the attitudes of White tenants toward Black tenants in public housing projects.

1. In one project, White and Black occupants were assigned to different buildings; that is, the project was racially segregated.

2. A second project mixed or integrated the two racial groups by assigning housing in the same buildings.

Only in the racially integrated project did prejudicial attitudes sharply decrease (Deutsch & Collins, 1951). This result strongly suggests that imposing rules to require equal-status contact can diminish prejudice.

This notion is reinforced by a larger social "experiment" that was done under far less controlled conditions. During the past 60 years, the United States has adopted

laws abolishing racial discrimination. The consequences were sometimes violent, but prejudice and discrimination have gradually diminished. Nevertheless, evidence for a shift in prejudiced attitudes comes from polls showing that, initially, in the 1940s, fewer than 30% of White Americans favored desegregation. Yet that percentage has steadily climbed to well above 90% in this era (Aronson, 2004). Similarly judicial decisions at the state level throughout the United States on marriage equality may be a modern example of legislation rapidly changing attitudes about a minority group that has long been the target of discrimination. Also, recognition by city, state, and federal authorities of discriminatory practices by police in their racial profiling, leading sometimes even to lethal actions against Blacks, is forcing institutional changes in hiring, training, and disciplining police. The violence unleashed in Ferguson, Missouri, over the shooting of a Black youngster by several white policemen was a dramatic example of what Attorney General Eric Holder recently reported as widespread, even endemic in too many police departments.



The police shooting and killing an unarmed African-American teenager in Ferguson, Missouri (August 9, 2014) triggered widespread community resentment and violent reprisals.

Because these changes in public opinion were not part of a carefully controlled experiment, we cannot say definitively that legislation caused people's prejudices to diminish. Nevertheless, we can argue that the increased number of Americans favoring desegregation and marriage equality, for example, is exactly what one might predict from cognitive dissonance theory. When the law requires people to act in a less discriminatory fashion, people have to justify their new behavior by softening their prejudiced attitudes. From this vantage point, it appears that legislation—when enforced—can affect prejudiced attitudes, after all. The July 2015 Supreme Court decision affirming the constitutional right of any American citizen to marry any partner of their choosing will surely change national attitudes on this contentious issue, despite lingering individual resistances.

## 11.9.3:  Stereotype Threat

Prejudice has another, unseen, effect. Believing yourself to be the object of prejudice can often lead to self-perceptions of being "lesser" in some way, and in turn determine how we perform on various tests of ability. That principle emerges from a large body of research in this new area of social psychology, started by researcher Claude Steele, his colleagues, and students (Steele and others, 2002). **Stereotype threat** refers to the negative effect on performance that arises when an individual becomes aware that members of his or her group are expected to perform poorly in that domain. This research reveals that performance on both intellectual and athletic tasks is shaped by awareness of existing stereotypes about the groups to which one belongs. It happens even if the person does not believe the stereotype is true; what matters is that others do and that the performer becomes aware that such a negative stereotype threatens his or her self-identity (Haslam and others, 2008).

In one study, college women in a math course took a special math test and scored as well as male students—unless they first identified themselves as female by checking a box indicating their gender. In that condition, their performance became significantly poorer, confirming the stereotype about women and math. Likewise, the stereotype of Blacks having lower IQs than Whites subconsciously creates anxiety that their performance will risk confirming this stereotype. That anxiety interferes with optimal cognitive processing and their positive self-identity, and they do indeed end up doing more poorly. Thus, making someone's identity salient where a negative stereotype exists about its deficiency in some domain leads to diminished performance on a variety of tasks, from spatial reasoning to golf scores (see McGlone & Aronson, 2006; Stone and others, 1999). Fortunately, new research is finding that it is possible to reverse this effect. To find out how, read on!

**STEREOTYPE LIFT AND VALUES AFFIRMATIONS**   Stereotype threat has a companion phenomenon known as stereotype lift: When people feel positively labeled with a stereotype, they also perform better. If Whites take a test they know to be evaluative of intellectual ability, or a test in which the negative stereotype of Blacks is made salient, they get a psychological edge from being on the upside of the negative stereotype and perform better (Walton & Cohen, 2003).

Accordingly, if Asian women taking a math test are required to focus on the fact that they are either women or

Asian, they do worse when reminded of their female status, but better when they are reminded of their Asian status (and the implicit stereotype of Asian math superiority). Again, here is stereotype lift at work. Thus, we can make stereotypes work for us as well as against our performance (Shih and others, 1999).

Could we use the notion of stereotype lift to counteract stereotype threat? Perhaps we encourage people to rediscover their best selves before tackling that challenging exam or course. How about having them affirm the values that matter most to them prior to being exposed to a course in which people in their group often do poorly? More specifically, what would happen if women affirmed their values just prior to starting an introductory physics course, where typically the average grade for women is C level, while it is B for males? Such a study was conducted by Akira Miyake and his research team (Miyake and others, 2010), which confirmed that the gender gap in college science achievement could be reduced dramatically by a simple psychological intervention of values affirmation.

In this double-blind experiment, with more than 500 students, half the male students and half of the females were randomly assigned to a writing exercise, which asked them to write about their most important values, prior to the start of their introductory physics course. To paraphrase the instructions: "Think about the things that are important to you. Perhaps you care about creativity, family relationships, your career, or having a sense of humor. Pick two or three of these values and write a few sentences about *why* they are important to you. You have fifteen minutes." For the Control condition, the other half of the students was told to think about their *least* important values and how they might relate to other people. Then, when students completed the class, researchers compared the two groups by testing their knowledge of basic physics. As can be seen in the graphed data in Figure 11.12, men outperformed women by an average of 10 points in the control group, which was right in line with stereotypical expectations that men are better than women in physics. Among the students who affirmed their own values, however, this gender gap nearly vanished. Women who were self-affirmed got better grades in the class and understood physics concepts better than the women who did not self-affirm. Thus, even a simple psychological intervention can have a major impact on the academic performance of women in the science subject of physics.

Geoffrey Cohen and colleagues also established the power of values affirmations with White and Black seventh graders, where Black students completing the exercise improved their grades significantly. What's more, the biggest gains were seen in the lowest achievers (Cohen and others, 2006). There is even more good news: These gains can be sustained over several years with a few simple booster sessions where children write about a different value or delve more deeply into ones they had written about earlier (Cohen and others, 2009).

## 11.9.4: Implicit Racial Bias Influences Criminal Sentencing

Stanford University Professor Jennifer Eberhardt recently won a MacArthur (genius) Award for her pioneering research that reveals how the implicit bias people have against those with black skin negatively influences the severity of their judgments in criminal sentences eligible for the death sentence, as well as other negative actions against them (Eberhardt & Hetey, 2014; Eberhardt & Rattan, 2010).

**Figure 11.12** Values Affirmation Reduces Gender Gap in Physics Grades and Concept Knowledge

In one study, her research team first collected photos of individuals already convicted for serious crimes and awaiting sentencing: In all cases, their juries had the option of handing down a death sentence. Then, after cropping the photos so that no indication of criminal conviction was evident, Stanford students (who were the participants in the experiment) were asked how "stereotypically black" each face appeared to be. No particular instructions of what it meant to be "stereotypically black" were included—instead, participants were told they could base their judgment on any characteristic that made sense to them. Two key findings emerged from this research:

- First, Eberhardt's team noted surprising consensus on what it meant to be "stereotypically black." Despite the fact that participants had all made their own judgments, with no guidelines from the experimenters, there was widespread agreement among participants regarding which faces were more "stereotypically black.

- Second, when sentences were eventually handed down for the convicted individuals, those with faces judged in the experiment to be more "stereotypically black" were more than twice as likely as "less black" faces to get the death sentence.

In other studies, Eberhardt linked implicit racial biases to a readiness to see Blacks as carrying dangerous weapons— with similarly disturbing results. To identify unconscious bias, participants in her experiments are put in front of computer screens and shown images of faces that go by so quickly that a person is unable to consciously detect what was seen. After each series of images, participants then saw a blurry object on the screen: in some cases, it was a gun, knife, or other weapon, and in other cases it was not (such as a stapler). Their task was to determine whether the object was a threat or not. When the series of faces were black faces, participants were much quickly to correctly identify weapons. When the faces were white, participants needed more images before they could determine whether the object was a weapon or not. Eberhardt concludes that seeing black faces creates an unconscious "readiness" to perceive an unidentified object as a weapon.

Eberhardt carries the lessons of her research into social action by working with and educating law enforcement agencies about their own learned racial biases that might prompt them to shoot innocent minority suspects when they should exercise more restraint. By teaching police officers about these studies, and how different implicit bias is from traditional racism, it helps them become more aware of how unconsciously race impacts our judgements. "I don't think this alone can change behavior, "Eberhardt says. (But) "If you combine that with other things, there is hope." (*New York Times Science*, January 5, 2015).

## Psychology Matters

# Is Social Pain Like Physical Pain?

In this section, we saw how our relations with others influence us to like or dislike them, even causing prejudice and discrimination. Many of these situations involve social pain. But have you ever wondered if social pain has any connection to physical pain?

We all hurt when we fall, get cut, mosquitoes bite us, or we are plagued with toothaches and headaches. It is an unpleasant feeling to be in physical pain, but that pain signal is vital for noticing that our homeostatic balance is disrupted and it is time to take action to deal with the symptoms and source of the pain.

- But what about other kinds of pain, when we are not included in the team or group we want to be in?
- How about when a friend dumps you?
- How do you feel about such outright rejections because of some subtle prejudices that may be operating?

Much social pain is stored in our memory bank of past rejections, abuse, and regret.

As a social species, we need to feel close to others—we need comfort, care, protection, and love. Being socially separated is a basic survival threat that can be psychologically painful. Social psychologist Naomi Eisenberger, in the UCLA Social and Affective Neuroscience Laboratory, recently investigated these two very different sources of pain—physical versus social—and found some surprising similarities.

How does Eisenberger investigate the nature of social pain and its links to physical pain? She and her research team study participants' brain reactions while in an fMRI scanner as they experience different scenarios. First, they play a virtual ball tossing game with two other supposed subjects, who at some point stop throwing the ball to the participant, throwing it only back and forth among themselves. Feeling excluded from this simple game with strangers illuminates the very same brain regions that are activated when we are experiencing physical pain. In addition, they found that those who are more sensitive to physical pain are also the ones who report feeling more rejected in the ball-tossing game (Eisenberger, 2013b). There is also genetic evidence that people who carry the more rare version of the *mu-opioid* gene, which is linked to a greater sensitivity to physical pain (opioids are potent painkillers), have both a greater sensitivity to physical pain and greater pain-related neural activity to social rejection. It follows, then, that taking pain meds designed to relieve physical pain should also reduce negative reactions to social exclusion. This was indeed found by comparing those who were asked to take acetaminophen for pain over a 2-week period versus those in a placebo condition. The physical painkiller drug led to reduced negative reactions to feelings of social exclusion.

Eisenberger's team also learned that physical warmth is comparable to emotional warmth (Eisenberger, 2012). First, they compared neural reactions of those who held hand warmers versus a neutral temperature hand pack. Next, participants were scanned when reading tender, loving emails from friends and family. The

neural activity in reward-related brain regions was the same for processing physical warmth as it was for processing social warmth from these loving messages! Figure 11.13 shows the remarkable similarities in brain activation for physical and social pain.

**Figure 11.13** Social and Physical Pain Produce Similar Brain Responses

In brains, social and physical warmth activate the same reward centers.



Social pain



Physical pain

So, receiving social support feels good in the same way that experiencing physical warmth does. In one final, amazing set of studies, Eisenberger wondered if givers of social support might receive a similar neural benefit (Eisenberger, 2013a). In a recent interview, Eisenberg described how she studied this pro-social activity.

> We've been interested in some of the neural underpinnings of this particular state. So we ran a study where we brought in [heterosexual] couples, and the female member of the couple was in the fMRI scanner, and essentially we scanned her brain while she was providing support to her partner. Her partner stood just outside of the fMRI scanner, and on certain trials he received electric shock. The female could support him on some trials by holding his arm as he went through this experience. This was a form of giving support to help somebody going through something negative or something painful. We actually saw more reward-related activity when the females were touching their partners when they were getting pain—when they were support-giving—compared to when they were just touching their partners and their partners weren't getting pain. It seems like maybe there was something more rewarding about being able to provide support than just being able to be in physical contact with your partner when they're not going through anything negativ. (Edge Video. 9.10. 2014).

# Key Question: How Do Systems Create Situations That Influence Behavior?

**Core Concept 11.3**

**Systems shape situations, which in turn affect behavior—and by understanding social systems, we can learn how to change them for the better, and modify their negative influences on us.**

We spend most of our lives in various institutions—family, schools, hospitals, jobs, military, prison, assisted living facilities—and may end in a hospice. Each of these settings involves systems of management and control, explicit and implicit rules of conduct, and reward and punishment structures, and they come complete with a history, a culture, and a legal status. In many cases, it is this system power that creates, maintains, and gives meaning and justification to a social situation. **System power** differs from social norms that come from within groups because it operates via institutionalized (and thus legitimized) systems in a top-down fashion to exercise control over groups and individuals. Although social psychologists have highlighted the influence of situations on behavior, they have tended not to acknowledge the greater power that systems have to make those situations work as they do, sometimes for the better, but sometimes for the worse. This, then, leads us to our next core concept for this chapter:

> Systems shape situations, which in turn affect behavior—and by understanding social systems, we can learn how to change them for the better, and modify their negative influences on us.

We will illustrate how system power can create a remarkably powerful social situation that affected the behavior of all within its behavioral context in research known as the **Stanford Prison Experiment**. Then, we will briefly examine other systems that have also generated abusive behavior, such as that in the Abu Ghraib prison in Iraq. Unfortunately, we do not have the space in this chapter to also illustrate in detail how network systems work for good causes. Here we are thinking about those involved in most nonviolent movements that train citizens in passive resistance, such as Gandhi in India, Martin Luther King, Jr. in the American civil rights struggle, and Nelson Mandela in opposing apartheid in South Africa. Similar system networks were also critical for Christians and others who helped Jews escape the Nazi Holocaust.

By the end of this section, you will be able to:

**11.10** Describe the findings of the Stanford Prison Experiment

**11.11** Explain how social systems play a role in understanding human behavior

**11.12** Recall the ill effects and ways of preventing bullying

# 11.10:  The Stanford Prison Experiment

**Objective:**  **Describe the findings of the Stanford Prison Experiment**

On a summer Sunday in California, a siren shattered the serenity of college student Tommy Whitlow's morning. A city police car screeched to a halt in front of his home. Within minutes, Tommy was charged with a felony, informed of his constitutional rights, frisked, and handcuffed. After he was booked and fingerprinted at the city jail, Tommy was blindfolded and transported to the Stanford County Prison, where he was stripped and issued a smock-type uniform with an I.D. number on the front and back. Tommy became "Prisoner 8612." Eight other college students were also arrested and assigned numbers during that mass arrest by the local police.

The prison guards were anonymous in their khaki military uniforms, reflector sunglasses, and nameless identity as "Mr. Correctional Officer," but with symbols of power shown off in their big nightsticks, whistles, and handcuffs. To them, the powerless prisoners were nothing more than their worthless numbers.

The guards insisted that prisoners obey all of their many arbitrary rules without question or hesitation. Failure to do so led to losses of privileges. At first, privileges included opportunities to read, write, or talk to other inmates. Later, the slightest protest resulted in the loss of "privileges" of eating, sleeping, washing, or having visitors during visiting nights. Failure to obey rules also resulted in a variety of unpleasant tasks such as endless push-ups, jumping jacks, and number count-offs that lasted for hours on end. Each day saw an escalation of the level of hostile abuse by the guards against their prisoners: making them clean toilets with bare hands, doing push-ups while a guard stepped on the prisoner's back, spending long hours naked in solitary confinement, and finally engaging in degrading forms of sexual humiliation.

"Prisoner 8612" encountered some guards whose behavior toward him and the other prisoners was sadistic, taking apparent pleasure in cruelty; others were just tough and demanding; a few were not abusive. However, none of the few "good" guards ever challenged the extremely demeaning actions of the "perpetrators of evil."

Less than 36 hours after the mass arrest, "Prisoner 8612," who had become the ringleader of an aborted prisoner rebellion that morning, had to be released because of an extreme stress reaction of screaming, crying, rage, and depression. On successive days, three more prisoners developed similar stress-related symptoms. A fifth prisoner developed a psychosomatic rash all over his body when the parole board rejected his appeal, and he too was released from the Stanford County Jail. Figure 11.14 shows some original photos from the famous experiment.

**Figure 11.14**  Images from Zimbardo's Stanford Prison Experiment



Palo Alto City police making surprise arrests of "mock prisoners" for a dramatic start to the Stanford Prison Experiment.



SPE prisoners were housed in small cells 24/7.



Guards enforced arbitrary rules with frequent punishments for such things as not knowing all prisoner number IDs.



The power of the guard role was evident in their military uniforms, Billy clubs, handcuffs, whistles, and special sunglasses.

## 11.10.1: What Caused the Behavior in the Stanford Prison Experiment?

Everyone in the prison, guard and prisoner alike, had been selected from a large pool of student volunteers. On the basis of extensive psychological tests and interviews, the volunteers had been judged as law-abiding, emotionally stable, physically healthy, and "normal-average" on all personality trait measures. In this mock prison experiment, assignment of participants to the independent variable treatment of "guard" or "prisoner" roles had been determined randomly. Thus, in the beginning, there were no systematic differences between the "ordinary" college males who were in the two different experimental roles of prisoner or guard. By the end of the study, there were no similarities between these two alien groups. The prisoners lived in the jail around the clock, and the guards worked standard 8-hour shifts. The prison "superintendent" was also the lead research investigator—and one of your authors—Phil Zimbardo.

As guards, students who had been pacifists and "nice guys" in their usual life settings behaved aggressively—sometimes even sadistically. As prisoners, psychologically stable students soon behaved pathologically, passively resigning themselves to their unexpected fate of **learned helplessness**. The power of the simulated prison situation had created a new social reality—a functionally real prison—in the minds of both the jailers and their captives. The situation became so powerfully disturbing that the researchers were forced to terminate the 2-week study after only 6 days.

---

**WATCH** Documented Video Clips of Prisoner-Guard Interactions



The emergent behavioral dynamics in the SPE were capture on 12 hours of videos.

Although Tommy Whitlow said he wouldn't want to go through it again, he valued the personal experience because he learned so much about himself and about human nature. Fortunately, he and the other students were basically healthy, and extensive debriefing showed that they readily bounced back from the prison experience. Follow-ups over many years revealed no lasting negative effects on these students. The participants had all learned an important lesson: Never underestimate the power of a bad situation to overwhelm the personalities and good upbringing of even the best and brightest among us, and the power of a system to create such situations (Zimbardo, 2007).

The basic results of this study were replicated in cross-cultural research in Australia (Lovibond and others, 1979). However, there was never the same degree of violence exhibited by the guards, perhaps because the Australian study followed the cultural norm of everyone having afternoon teatime! For detailed information about this dramatic study and many related issues, go to http://www.prisonexp.org.

**Suppose you had been a subject in the Stanford Prison Experiment. Would you have been a good guard—or a sadist? Would you be a model compliant prisoner—or a rebel? Could you have resisted the pressures and stresses of these circumstances?**

A similar question could be raised about how you think you might have behaved if you were the "Teacher" in the Milgram obedience research—obey or defy? We'd all like to believe we would be good guards and heroic prisoners; we would never step across that line between good and evil. And, of course, we all believe that we would be able to keep things in perspective, knowing that it was "just an experiment," only role playing and not real. But the best bet is that most of us would react the same way as these participants did. This disturbing study raises many questions about how well we really know ourselves, our inner dispositional qualities, and how much we appreciate the subtle powers of external forces on us, the situational qualities. Obviously, it also raises ethical issues about whether such research should have ever been done or allowed to continue.

## 11.10.2: How Did the Stanford Prison Experiment End Up?

By the conclusion of the Stanford Prison Experiment, guards' and prisoners' behavior differed from each other in virtually every observable way (see Figure 11.15). Yet, it was only chance, in the form of random assignment, that had decided their roles—roles that had created status and power differences that were validated in that prison-like situation and supported by the system of prison experiment authorities.

No one taught the participants to play their roles. Without ever visiting real prisons, all the participants had earlier in their lives learned information about the interaction between the powerful and the powerless. A guard type is someone who limits the freedom of prisoner types to manage their behavior and make them behave more predictably. This task is aided by the use of coercive rules, which include explicit punishment for violations. Prisoners can only react to the social structure of a prisonlike setting created by those with power. Rebellion and compliance are the only options of the prisoners; the first choice results in punishment, while the second results in a loss of autonomy and dignity.

## Figure 11.15 Guard and Prisoner Behavior in the SPE

Here, you can see the extreme differences in behavior between the guards and prisoners in the experiment.



**Guards**
**Prisoners**

Categories (top to bottom):
- Commands
- Insults
- Deindividuating reference
- Aggression
- Threats
- Questions
- Information
- Use of instruments
- Individuating reference
- Helping
- Resistance

X-axis: Frequency (0 10 20 30 40 50 60 70 80 90 100 110)

The student participants had already experienced such power differences in many of their previous social interactions in various systems of control: parent–child, teacher–student, doctor–patient, boss–worker, male–female. They merely refined and intensified their prior patterns of behavior for this particular setting. Each student could have played either role. Many students in the guard role reported being surprised at how easily they enjoyed controlling other people. The toughest guard recalled later for a TV documentary that the guards were like puppeteers pulling the strings of their prisoner-puppets—and "getting our jollies off" in the process. Just putting on the uniform was enough to transform them from passive college students into aggressive prison guards.

### WRITING PROMPT

**Situational Influences on Power and Powerlessness**

Have you ever been in a situation where you felt either power or powerlessness in your role? In what ways did the situation, and your perception of power or powerlessness, change?

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

## 11.10.3: Comparing Milgram's Research to the Stanford Prison Experiment

Milgram's obedience research and the Stanford Prison Experiment form bookends of much research illustrating the power of situations over behavior. However, the obedience studies were about *individual* authority power, while the prison experiment is about the power of an institution, a *system* of domination. The guards maintained the situation of abuse, but so did the research team of psychologists; the police contributed to its reality, as did many others who visited the prison setting—a prison chaplain, a public defender, parents and friends on visiting nights, and civilians on the parole board. This classic experiment in social psychology was made into an award-winning feature film in 2015 (see Figure 11.6).

## Figure 11.16 The 1971 SPE Becomes a Hollywood Movie in 2015



### WRITING PROMPT

**What Do You Think About These Experiments?**

What do you think about this ethical issue: Should research like the Stanford Prison Experiment or the Milgram Obedience Study ever be allowed again? If so, with what limits and safeguards?

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

## 11.11: Chains of System Command

**Objective:** Explain how social systems play a role in understanding human behavior

Psychologists seek to understand behavior in order to promote prosocial forms and alter for the better antisocial

aspects of behavior. Understanding why some people engage in "bad behaviors" does not excuse them; rather, it leads to new ideas about changing the causal influences on those behaviors. A full understanding of most complex human behavior should include an appreciation of the ways in which situational conditions are created and shaped by higher-order factors—*systems of power.* Systems, not just dispositions and situations, must be taken into account in order to understand complex behavior patterns.

Aberrant, illegal, or immoral behavior by individuals in service professions, such as policemen, corrections officers, or soldiers, or even in business settings, is typically labeled the misdeeds of "a few bad apples." The implication is they are a rare exception and must be set on one side of the impermeable line between evil and good, with the majority of good apples set on the other side. But who is making that distinction? Usually it is the guardians of the system—who want to isolate the problem to deflect attention and blame away from those at the top who may be responsible for creating impossible working conditions or for a lack of their oversight or supervision. Again the *bad apple–dispositional view* ignores the *bad apple barrel–situational view* and its potentially corrupting situational impact on those within it. A systems analysis focuses on the next step higher, on *the bad barrel makers–systemic view*, on those with the power to design the barrel. It is the "power elite," the barrel makers, often working behind the scenes, who arrange many of the conditions of life for the rest of us who must spend time in the variety of institutional settings they have constructed.

## 11.11.1: The Systems Lesson

The most important lesson to be learned from the core concept for this section is that *situations are created by systems.* Systems provide the institutional support, authority, and resources that allow situations to operate as they do. **System power** involves authorization or institutionalized permission to behave in prescribed ways or to forbid and punish actions that are disapproved. It provides the "higher authority" that gives validation to playing new roles, following new rules, and taking actions that would ordinarily be constrained by existing laws, norms, morals, and ethics. Such validation usually comes cloaked in the mantle of ideology. *Ideology* is a slogan or proposition that usually legitimizes whatever means are necessary to attain an ultimate goal. The programs, policies, and standard operating procedures that are developed to support an ideology become an essential component of the system. The system's procedures are considered reasonable and appropriate as the ideology comes to be accepted as sacred.

However, although all systems involve individuals at varying levels of power and status, most systems are not transparent; that is, systems typically conceal much of their operation from outsiders. So even when a system is failing to meet its objectives and goals, as many failing educational or correctional systems are (as well as corporations that engage in corrupt practices), higher-ups are hidden from public scrutiny.

Nevertheless, to change undesirable behavior and promote more socially desirable behavior, it is *not* sufficient to continue to rely on the individualistic medical model of treating people (or disciplining individuals) for problem behavior when the situation might be a fault. And plans to improve situations must involve understanding and modifying the systems that create and maintain them. Instead, our call is for using a *public health model* that recognizes individual affliction and illness as the consequence of a vector of disease in society. *Prevention* rather than just treatment becomes the goal; inoculating against a virus prevents the spread of an epidemic. This should be as true for the evils of prejudice, violence, and bullying in our society as it is for viral infections. One of the more notable examples of the power of a system to influence individual behavior occurred a decade ago at the U.S. military prison in Abu Ghraib, Iraq.

## 11.11.2: Using Psychology to Understand the Abuses at Abu Ghraib

Over a 3-month period, military police, Army reservists working the night shift at Tier 1-A in that dungeon, used some of the 1,000 prisoners detained there as their "playthings"—piling them naked in pyramids, hanging them upside down with women's panties over their heads, dragging them around the ground on dog leashes, and sexually degrading them in various ways. Tier 1-A was the interrogation center run by military intelligence, the CIA, and a civilian interrogator contractor. When the unexpected insurgency against the U.S. forces suddenly escalated, the chain of command needed "actionable intelligence" from these detainees. So the MP prison guards were given permission by higher-ups to "soften up" the prisoners, to prepare them for interrogation, to "take the gloves off."

Given that official permission for abuse, and with no senior officer ever providing oversight or surveillance of that night shift, all hell broke loose. However, the soldiers did not think what they were doing was wrong; one said it was only "fun and games." In fact, they documented these games with their own candid photographs of themselves with their abused prisoners in hundreds of horrific images.

Abu Ghraib MPs took more than 1,000 photos documenting their abusive, degrading treatment of Iraqi prisoners.

One investigating committee was headed by James Schlesinger, former Secretary of Defense, and included generals and other high-ranking officials. The report notes the relevance of social psychological research and theory to the understanding of these abuses:

> The potential for abusive treatment of detainees during the Global War on Terrorism was entirely predictable based on a fundamental understanding of the principles of social psychology coupled with an awareness of numerous known environmental risk factors. . . . Findings from the field of social psychology suggest that the conditions of war and the dynamics of detainee operations carry inherent risks for human mistreatment, and therefore must be approached with great caution and careful planning and training.
>
> Such conditions neither excuse nor absolve the individuals who engaged in deliberate immoral or illegal behaviors [even though] certain conditions heightened the possibility of abusive treatment.

The **Schlesinger Report** boldly proclaims that the "landmark Stanford study provides a cautionary tale for all military detention operations." In contrasting the relatively benign environment of the Stanford Prison Experiment, the report makes evident that "in military detention operations, soldiers work under stressful combat conditions that are far from benign." The implication is that those combat conditions might be expected to generate even more extreme abuses of power by military police than were observed in our mock prison experiment. The *Schlesinger Report* concludes with a statement that underscores much of what we have presented in this chapter: "Psychologists have attempted to understand how and why individuals and groups who usually act humanely can sometimes act otherwise in certain circumstances." Among the concepts this

report outlines to help explain why abusive behaviors occur among ordinarily humane individuals are deindividualization, dehumanization, enemy image, groupthink, moral disengagement, social facilitation, and other environmental factors.

There are fewer more direct statements that we are aware of that highlight the value of psychological theories and social psychological research than this official government report. The full report, and especially Appendix G, which is notable for students of psychology, can be found here.

The social psychological analysis of the abuses by ordinary men and women (in their roles as military police prison guards) against other ordinary men and women (in their roles as prisoners of war) illustrates the value of applying psychological concepts to understanding complex individual, situational, and systemic behaviors.

# 11.12: Preventing Bullying by Systemic Changes and Reframing

**Objective:** Recall the ill effects and ways of preventing bullying

**Bullying** in school and in the workplace is primarily about some students and workers making life miserable for others by extreme teasing, threatening, physically abusing, and damaging personal reputations through lies and gossip (see Figure 11.17). Most other students and co-workers are neither bullies nor victims, but bystanders aware of the problem—yet they usually ignore it or passively accept it (Coloroso, 2008). The traditional method for dealing with bullies is to identify the culprits and punish them in various ways, moving them to other classes, schools, or jobs. This is likely to move the abusers and their abuse to different venues but not change them; often it makes them even angrier and more vengeful. Bullying is defined as systematically and chronically inflicting physical hurt and/or psychological distress on one or more others, whether they are students in school or workers in the workplace.

In the 1990s, statistics on the prevalence of bullying revealed that it was relatively low in Sweden, with an estimated 15% of all Swedish schoolchildren being bullied or admitting to being bullies themselves (Olweus, 1993). However, a more recent survey documented a dramatically higher prevalence in Britain, with 73% of a British sample reporting being bullied, being the bully perpetrator, or having witnessed bullying directly (McLeod, 2008). This large-scale study included nearly 2,000 students, aged 12 through 19, across 14 schools. In

**Figure 11.17** Types of Bullying Reported

Bullying comes in a variety of forms in many venues



a 2010 survey of 43,000 high school students in the United States, half said they'd bullied someone in the past year, and nearly half said they'd been physically abused, teased, or taunted in a way that seriously upset them (Dalton, 2010). Among the negative fallout of bullying is shown in the estimated 160,000 students who have refused to go to school because of the possible physical and verbal aggression of their peers (as reported at www.nobully.com).

## 11.12.1: What Does Bullying Look Like Today?

The following are the most frequently experienced types:

- **Physical bullying:** Direct physical force is used to hurt someone else by hitting, pushing, shoving, kicking, pinching, or holding them down. Physical bullying also includes taking or breaking someone's belongings or stealing or extorting money.
- **Verbal bullying:** Use of words to hurt someone. This includes threatening, taunting, intimidating, insulting, sarcasm, name-calling, teasing, slurs, graffiti, put-downs, and ridicule. It also includes hostile gestures such as making faces, staring, giving the evil eye, eye rolling, and spitting.
- **Relational bullying:** Leaving someone out of a group or purposely excluding them, gossiping, teasing, whispering, and spreading rumors. It includes turn-ing your back on someone else, giving them the silent treatment, ostracizing, or scapegoating.

- **Cyberbullying:** Use of cell-phones, text messages, emails, instant messages, web blogs, and postings to bully another student in any of the ways just described. Examples of cyberbullying are sending threatening or insulting messages by phone and email and spreading destructive rumors that ruin the reputation of a fellow student or worker.
- **Harassment:** Offensive and possibly threatening behavior, including the use of extreme verbal language, offensive questions or statements, stalking, physical force, or unwanted sexual advances. Sexual harassment is persistent and unwanted sexual advances, where the consequences of refusing could be harmful to the victim. Usually harassment is a repeated set of actions, but not always.
- **Parents publicly shaming kids:** Some parents are using social media images and voice messages to shame their children over what they consider shameful behavior. Images are of tweens or teens with long hair cut off by parents, or in streets holding signs, saying, "I am a liar and a thief"; "I am on the road to failure," and more. (see *Time*, The View, July 6–13, 2015, pp. 27–28)

Bullying can occur just about everywhere: in any kind of school—poor or wealthy, public or private, single-sex or co-educational, conservative or progressive. It happens in

or outside the classroom, in the workplace, and online. Boys and girls are equal targets of bullying. In most cases, boys bully other boys, and girls bully other girls. As Evelyn Field (2007), author of *Bully Blocking: Six Secrets to Help Children Deal with Teasing and Bullying*, explained:

> Bullying is a game where some children systematically abuse their power. Bullies can go on a shopping spree at the beginning of every year looking for suitable targets . . . Boys often use bullying tactics to make a reputation and girls do so to protect their reputation. Boys tend to be hunters who belong to large, hierarchical tribes. They typically bully openly and prefer physical bullying. They focus upon individual achievement and action, supported by their physical prowess. They are less interested in teasing, exclusion and indirect bullying [tactics favored by girls] (pp. 7, 8).

Some argue that bullying is no worse than it used to be and kids today should just "suck it up," while others are convinced bullies are going too far. Recently bullying has become an international concern due to escalated violence and a number of teen suicides traced to cyberbullying. Though "technology is not radically changing what's happening, it's simply making what's happening far more visible," says social media researcher Danah Boyd (Leach, 2010), it is difficult to deny the impact the Internet has had on the bullying landscape. Because of the permeability and reach of the Net as well as anonymity of users, not only has **dehumanization** become easier—its impact has become greater and even lethal.

Interestingly, the earliest instance of cyberbullying was the anonymous abuse heaped upon Monica Lewinsky, before the Internet was developed, after she was exposed to having had sex with her boss, The President of the United States, Bill Clinton, in the Oval Office. In a recent TED talk (2015) Lewinski describes in eloquent detail her shame and the harm she experienced from those secret attackers. You can view her TED talk using the link we've provided at the end of this chapter.

## 11.12.2: Effectively Preventing Bullying

Prevention of bullying requires switching from the usual punishment model of bullies to a system-wide set of practices that give zero tolerance for bullying. The impetus for change must come top-down from school superintendents and principals, involving teachers and parents, and then enabling students themselves as agents of change (Kalman, 2008). Researcher Dan Olweus (1993) has used such a system change model in Sweden and other Scandinavian countries with considerable success. In the United States, students who seem "different," are more shy, have physical handicaps, or are LGBT are bullied. "Actual or perceived sexual orientation is one of the most common reasons that students are harassed by their peers, second only to physical appearance," according to psychologist Peter Goldbaum (Novotney, 2008). At the core of new programs to combat and prevent bullying is developing curricula and practices from elementary school throughout all grades that promote respect for the dignity of individuals and for acceptance and tolerance of human diversity.

For bullying issues that revolve around the target's image, your authors advocate changing the self-image and sense of helplessness of those individuals. They can learn to stop communicating through body language that they are vulnerable targets. They can be taught how to cultivate positive self-esteem, new body language, and effective social communication skills as well as ways to get more social support from their peers. In their book *Stick Up For Yourself: Every Kid's Guide to Personal Power and Positive Self-Esteem*, Gershen Kaufman and his colleagues (1999) explain:

> Positive self-esteem is the single most important psychological skill we can develop in order to thrive in society. Having self-esteem means being proud of ourselves and experiencing that pride from within. Without self-esteem, kids doubt themselves, cave in to peer pressure, feel worthless or inferior. . . . With self-esteem, kids feel secure inside themselves, are more willing to take positive risks, are more likely to take responsibility for their actions, can cope with life's changes and challenges, and are resilient in the face of rejection, disappointment, failure, and defeat. (p. ii)

Note: Self-esteem should not be confused with arrogance, contempt, or a big ego. People who have positive self-esteem don't depend on what other people think of them because they are confident of their worth and happy in their own skins.

Historically, bullies were viewed as having various mental health deficiencies, but new research reveals a very different social dynamic is operating. Many people bully others as a means to climb the social hierarchy among their peers. Most bullying is occurring among students who are in the middle to upper ranges of social status in their schools. It is not happening at the highest or lowest status levels. A research team of sociologists followed approximately 3,700 U.S. students in grades 8 to 10 for one school year, identifying acts of social aggression and relating them to indices of social status (Faris & Felmlee, 2011). Each student was asked to list five students who had been mean to them or picked on them, with aggression defined as activities intending to cause harm or pain, physically or emotionally. Status was established as how central a student was in friendship networks where each student nominated his or her five best friends. Those with highest status have no need to bully anyone, and those with lowest status don't have the social power to pull off being aggressive. For more on bullying, see http://www.nobully.com.

**Psychology Matters**

# Using Psychology to Learn Psychology

You may associate persuasion with advertising and politics, but persuasion does not stop there. It is woven into all human inter-action—including the exchanges of ideas that occur in the classroom. There, your professors and fellow students will attempt to persuade you with reasoned arguments, and they will expect you to set out your points of view in the same fash-ion. But, aside from the open exchange of ideas and opinions, there are other, more subtle persuasive pressures of which you should be aware, says social psychologist Robert Cialdini (2001). If you don't know about these, you run the risk of letting other people make up your mind for you. Let's review three such subtle forms of influence that you will encounter in your college or university experience.

## Authority

The lectures you hear and the textbooks you read are full of authority figures. Every reference in this text, for example, cites an authority. Most are given, in part, to persuade you that the argument being offered is credible. The problem, of course, is that ideas are not true merely because some authority says so. For example, just a few years ago, every introductory psychol-ogy text in print taught that no new neurons were created in the brain after birth. Now we know—thanks to the newest research—that the textbooks and the experts they cited were wrong. Real proof of such assertions, however, requires more objective evidence obtained by the scientific method—not just the declaration of an authority.

## Social Validation

Although you may see a popular movie because your friends like it, going along with the crowd is a poor basis for judging the theories you encounter in your classes. Many of the world's discarded ideas were once accepted by nearly everyone. In psychology, these include the false notions that we use only 10% of our brain, that personality is determined by the first 2 years of life, and that IQ tests are a good measure of innate abilities. So, rather than accepting what you hear and read, questioning even the most widely held concepts is a good habit. In fact, most famous scientists have built their careers on challenging ideas that everyone else accepted.

## The Poison Parasite Argument

In advertising, a good way to undermine a competitor, says Cialdini, is with a message that calls into question the oppo-nent's credibility. Then, to get people to remember what you have said, you can infect your opponent with a "parasite"—a mnemonic link that reminds people of your message every time they hear your opponent's pitch (Brookhart, 2001). A classic example involved antismoking ads that looked like Marlboro commercials, except that they featured a coughing, sickly "Marlboro Man." You may encounter the same sort of poison parasite argument in a lecture or a textbook that attempts to hold someone's ideas up to ridicule. That's not necessarily bad: In the academic world, weak ideas should perish. The sneaky, dishonest form of this technique, however, involves a misrepresentation or oversimplification of the opponent's argu-ments. The antidote is to be alert for ridicule and to check out the other side of the argument yourself.

The social psychology of persuasion, of course, involves much more than we have discussed here. A good place to look for a broader set of information is Cialdini's (2007) book *Influ-ence: The Psychology of Persuasion*. And, if you want to focus on becoming more persuasive yourself, check out *Yes! 50 Sci-entifically Proven Ways to be Persuasive* (Goldstein and others, 2008). Perhaps the most important idea here is that some knowledge of persuasion can forearm you against the persua-sive techniques you will encounter, both in and out of the class-room. When you know how effective persuaders operate—as "influence professionals"—you are less likely to donate money to causes you don't care about, buy a car you don't really like, or accept a theory without examining the evidence critically.

# Critical Thinking Applied: Is Terrorism a "Senseless Act of Violence, Perpetrated by Crazy Fanatics"?

The terrorist attacks of September 11, 2001, in America and later, as well as recent suicide bombings in Israel, Iraq, London, Madrid, Tunisia, Paris, Mali, Egypt, and elsewhere around the world raise questions for which there are no easy answers. *Terrorism* is really about psychology. It typically involves a relatively small group of people working as a network who take dramatic, violent actions against a larger group with the intention of spreading fear of death among them and inducing anxiety and uncertainty about their government's ability to protect them. Terrorists do not want to conquer other nations' land, as in traditional wars, but to conquer the minds of their enemies by making them feel victimized and fearful of random attacks. Recent viral videos (2015) of innocent victims being beheaded or burned alive in a cage by terrorist groups such as ISIS/ISIL, promoting their Islamic State values, reveal the extent to which they will go for global notoriety.

## What Are the Critical Issues?

Global terrorism is an escalating threat that many nations must face in the coming years. Terrorists operate in networks that vary in their degree of organization, but they are not national states. A war against terrorism is an *asymmetrical war,* of nations against collectives of individuals, without uniforms or designated sovereign territories. Their tactics are hit and run, attacking at random times, amplifying the surprise value of their destructive power.

Some of the critical issues for you to consider include the following. How can a war against terrorism ever be "won"? What would winning actually look like if there were no one leader to surrender? Why is the best strategy for meeting this global challenge international cooperation and intelligence resource sharing rather than dominant nations acting unilaterally? What is the pipeline that is generating so many terrorists? In what sense can the threat of terrorism be reduced by "winning the hearts and minds" of young people who might be recruited by elders to join terrorist cells or be trained to become suicide bombers?

## What Critical Thinking Questions Should We Ask?

The reasons for terrorist violence are many and complex. However, media sources of such claims try to simplify complexity and reduce ambiguity to simple frameworks. They often exaggerate fears for viewers and listeners. "If it bleeds, it leads" is a classic statement about what it takes to be the lead TV news item (see Breckenridge & Zimbardo, 2006, about mass-mediated fear). When they or the general public do not understand something, there is a readiness to label it "senseless." That only means it does not make sense to them or that there is no solid evidence for the motivations behind it. For example, vandalism has been called "senseless" until it becomes apparent that it is often done by have-nots who are trying to make an impact on society, a destructive, dramatic one when they are not able to make a more constructive one. As citizens and critical thinkers, we need to call for better information from our politicians, educators, journalists, and others who may try to assign easy answers to complex problems.

## Is the Claim Reasonable or Extreme?

Obviously this is an extreme generalization and simplification of a complex social-political-cultural issue. Unfortunately, the easiest and most simplistic response is to demonize those who perpetrate evil deeds—but that is merely name calling, and we should resist it, not to excuse it but to learn what factors lead to such deeds. Mere name-calling blinds us to the power of the situation to create aggression in ordinary people, as we have seen in the Milgram and Stanford Prison research. More important, it prevents us from dealing with the situations that nurture violence. Labeling others as "evil" or "pathological" usually prevents any attempt to understand the reasons for their actions, instead making them into objects of scorn or disdain. Again, it is a related mistake to think of violence and terrorism as "senseless." On the contrary, destructive deeds always make sense from the perpetrator's frame of reference. As Shakespeare's Hamlet said, there is "method" in madness: We must understand the method in the minds of potential terrorists if we are to deter them.

## What Is the Evidence?

A summary of recent perspectives on what moves people to kill themselves and innocent bystanders is available in a thorough report by *New York Times* correspondent Sarah Kershaw (2010). Research has shown that aggressive behavior can be induced by situations that create prejudice, conformity, frustration, threat, or wounded pride (Aronson, 2004; Baumeister and others, 1996; Hassan, 1998/2015). There is no evidence that terrorists, even suicide bombers, are pathological. Rather, they are filled with anger and desire for revenge against what they perceive as injustice. They are often well educated, in stable relationships, and now likely to be from both sexes. In many cases, they become

part of a systematic training program to learn the skills necessary to effectively destroy one's perceived enemy and accept being a martyr for a cause they believe is just (Merari, 2006).

The rise in power of the new Islamic group ISIS has been dramatic in attracting an estimated 5,000 foreign fighters to its cause since 2012. Their recruiting tactics center on use of sophisticated social media strategies. There are at least 46,000 ISIS-linked Twitter accounts over a vast network of Twitter "Fanboys" to organize events. Facebook friendships are formed, sympathy is offered to lonely people, missions are envisioned. Then ISIS adds sophisticated media via its Al Hayat Media Center that makes videos, films, and TV shows targeting non-Arabic recruits, with messages tuned to various nations, like Germany, England or France. The media is their message of attack against Western infidels, and many young people are buying it. (Source: *Time* magazine, p. 10, July 5-13, 2015.)

Another analysis argues that many suicide terrorists are people who are not usually radicalized individuals; rather, terrorist groups recruit those they identify as unhappy, damaged young men and women who want to die. Ironically, in the Muslim world, the stigma against conventional suicide is strong (Lankford, 2013).

The flammable combination of poverty, powerlessness, and hopelessness is the tinder that the September 11 attacks were intended to ignite, says Jonathan Lash (2001), president of the World Resources Institute in Washington, D.C. Much of the world lives in poverty and hunger and sees no way out. Ethnic hatred and wars aggravate their plight. Moreover, the number of people living in these miserable conditions is increasing, as most of the world's population explosion is occurring in poorer countries. And, to make matters more volatile, says Lash, a large proportion of these desperate people depend directly on resources that are rapidly being depleted: fisheries, forests, soils, and water resources. As a result, every day, thousands flee their traditional homelands and stream into the largest and poorest cities. Most are young—a result of the high birth rates in the Third World. Mr. Lash warns that urban slums, filled with restless, jobless young men, are "tinderboxes of anger and despair; easy recruiting grounds for [the former terrorist master] bin Laden or those who may come after him" (p. 1789). We have seen this in recent violent riots in the slums outside Paris by young immigrants without jobs and few educational opportunities.

## Could Bias Contaminate the Conclusion?

Several biases are at work here: first, the dispositional bias of focusing on individual perpetrators and ignoring their behavioral context, the situation, and the system that gives shape and purpose to their actions; second, a simplification bias that reduces difficult, complex issues to simple terms that give an illusion of easy solutions. The reasoning behind making and accepting this assertion about terrorism and terrorists includes giving in to common fallacies, as we have seen. Combating it involves understanding the immediate causal contributions leading to becoming a terrorist as well as the broader systemic influences on such extreme decisions that individuals and groups make.

## What Conclusions Can We Draw?

Understanding terrorism requires the combined insights of many perspectives—and not just those from psychology. Issues of money, power, resources, and ancient grudges must be considered as well. But—like it or not—many people in the world perceive the United States as the enemy. Understanding this perception—and dealing constructively with it—demands that Americans see the conflict from someone else's point of view: those who consider the United States to be the enemy.

We must also realize that terrorism does not always involve international conflict. Just consider the student shootings at Columbine High and Virginia Tech University, and the mass murders and wounding of innocent civilians as recently as early 2011 in Tucson, Arizona, along with thousands of racial/ethnic hate crimes, attacks against LGBT individuals, and violence directed at abortion providers that have made news in recent years (Doyle, 2001). It would be a mistake to believe that terrorism is always an outside threat from foreigners: Even though some cultures are more violent than others, every culture can breed violent people who terrorize others (Moghaddam and others, 1993; Shiraev & Levy, 2001). Just remember that the bomber who blew up the Oklahoma City federal building and killed hundreds of innocent people was an American terrorist named Timothy McVeigh. The Ku Klux Klan was (is) a uniquely American terrorist organization acting in violent ways to instill fear and terror in Blacks and others they considered their enemy. The young man who murdered nine churchgoers during a prayer service in a Black church in Charleston, South Carolina, in 2015 should be considered a home-grown terrorist, especially so because his hate crime triggered burnings of six other Black churches in the South in the following weeks.

We have seen the enemy, and it is as likely to be *us*—as it is to be *them*.

## A Positive Endnote

We can think of no better way to end a chapter that focused mostly on the way good people go bad than to

leave you with a wonderful statement about the unity of humankind and the need to respect our kinship with one another. It is from poet and preacher John Donne (*Meditations XVII*):

> All mankind is of one author, and is one volume; when one man dies, one chapter is not torn out of the book, but translated into a better language; and every chapter must be so translated. . . . As therefore the bell that rings to a sermon, calls not upon the preacher only, but upon the congregation to come: so this bell calls us all. . . . No man is an island, entire of itself . . . any man's death diminishes me, because I am involved in mankind; and therefore never send to know for whom the bell tolls; it tolls for thee.

So, when in doubt: Take the high moral road, be mindful of situational forces, be wary of potentially unjust authority, be sensitive to your need to "go along to get along with others," accept personal responsibility for your actions, keep your critical facilities activated, be ready to acknowledge you made a mistake (saying so undercuts dissonance), work in collaborative teams, and be alert to power abuses of all kinds.

Finally, please consider adopting a new "heroic imagination" that transforms your personal sense of compassion for others into heroic action that helps them, and in so doing changes the world for the better by your readiness to stand up, speak out, and act wisely and effectively in the challenging situations you face in your life.

Consider a new social role for yourself by declaring, "I am an **Everyday Hero in Training**."



The Heroic Imagination Project has successfully used the lessons of social psychology to teach people to stand up and speak out effectively—to do the wise and right thing—in challenging situations where social norms may have instead influenced them to passively stand by and do nothing.

# Summary: Social Psychology

## Chapter Problem

What makes ordinary people willing to harm other people, as they did in Milgram's shocking experiment?

- Individual behavior is influenced by situational factors more than we recognize, for better or for worse, but awareness of how they operate can fortify us against their negative power.
- Situations are also personal mental constructions, as each creates subjective realities of the behavioral contexts around us, and of the people we deal with in loving or hateful relationships.
- Most psychologists have largely ignored systematic forces, but effective major behavioral change must include recognizing how systems create and justify situations, which in turn can come to exert power on our thinking, feeling, and acting.

## How Is Our Behavior Affected by the Social Situation?

> **Core Concept 11.1**
>
> **We usually adapt our behavior to the demands of the social situation, and in new or ambiguous situations, we take our cues from the behavior of others in that setting.**

Social psychologists study the behavior of individuals or groups in the context of particular situations. Much research in this area reveals how norms and social roles can be major sources of situational influence. The Asch studies demonstrated the powerful effect of the group to produce conformity, even when the group is clearly wrong. Another shocking demonstration of situational power came from Stanley Milgram's controversial experiments on obedience to authority. Situational influence can also lead to inaction: The bystander studies showed that individuals are inhibited

by the number of bystanders, the ambiguity of the situation, and their resultant perception of their social role and responsibility. Groupthink occurs even in the highest level of government decision making, whereby smart people advocate actions that may be disastrous by mindlessly following the consensus of the group or its leader's opinion. Heroes are often ordinary people who take extraordinary action to help others or oppose evil activities. We usually adapt our behavior to the demands of the social situation, and in ambiguous situations, we take our cues from the behavior of others.

## Constructing Social Reality: What Influences Our Judgments of Others?

> **Core Concept 11.2**
>
> **The judgments we make about others depend not only on their behavior but also on our interpretation of their actions within a social context.**

The situation, by itself, does not determine behavior. Rather, it is our personal interpretation of the situation—our constructed social reality—that regulates behavior, including our social interactions. Usually we are attracted to relationships that we find rewarding, although there are exceptions, predicted by **expectancy-value theory** and **cognitive dissonance theory**. Attribution theory predicts that we will attribute other people's blunders to their traits or character (the **fundamental attribution error**) and our own to the situation (the **self-serving bias**), although this tendency depends on one's culture. Healthy, loving relationships also demonstrate the social construction of reality, because there are many kinds of love and many cultural variations in the understanding and practice of love.

Prejudice and **discrimination** also demonstrate how we construct our own social reality through such cognitive processes as the perception of social distance and threats, the influence of media stereotypes, **scapegoating**, and **dehumanization**. We are all vulnerable to **stereotype threat** that can have a negative impact on our performance when we are made aware that we belong to a group that does poorly on certain tasks and tests.

The judgments we make about others depend not only on their behavior but also on our interpretation of their actions within a social context. Implicit racial biases against citizens of color among police officers can be modified via newly applied training programs utilizing current social psychological knowledge.

## How Do Systems Create Situations That Influence Behavior?

> **Core Concept 11.3**
>
> **Systems shape situations, which in turn affect behavior—and by understanding social systems, we can learn how to change them for the better, and modify their negative influences on us.**

Many studies in social psychology—particularly those dealing with obedience and conformity—show that the power of the situation can pressure ordinary people to commit horrible acts, such as those of soldiers in Iraq's Abu Ghraib Prison. Understanding such complex behavior involves three levels of analysis: the individual's dispositions, the situation's forces, and the power of the system that creates and maintains specific situations.

The **Stanford Prison Experiment** put "good apples" in a "bad barrel" for nearly a week to test the dispositional versus situational explanations for the adverse outcomes. However, what has been ignored is the system that generates such bad barrels. Changing unacceptable behavior, such as **bullying**, discrimination, or terrorism, requires understanding how to modify systems of power and the situations they create and sustain, not just behavior modification of the individual actors. Bullying continues to be a national problem not only in schools and businesses but also via the Internet with cyberbullying, and now a new version with parents shaming their children publicly on Internet sites.

Systems are complex structures embedded in a matrix of cultural, historical, economic, political, and legal subsystems that must be identified and changed if they generate illegal, immoral, or unethical behavior. A full social psychological analysis of any important social problem must include all three essential features: the personal-dispositional (what the person brings into any setting); the situational-social context; and the System that creates, maintains and can alter situations.

New research reveals parallels between social pain (rejection, social exclusion) and physical pain (body hurts), and also between social warmth (kindness, caring) and physical warmth (heating the body).

## Critical Thinking Applied: Is Terrorism a "Senseless Act of Violence, Perpetrated by Crazy Fanatics"?

Terrorism is a widespread global phenomenon likely to be a permanent feature of the threats posed to nations by networks of individuals in an asymmetrical war. It is important to understand terrorist acts as a psychological process, as well as the political, cultural, economic, and religious contributions to creating this new role of someone becoming a terrorist. One strategy of prevention is learning how to win the hearts and minds of potential terrorist recruits away from violence and toward becoming prosocial change agents to rectify wrongs in their communities and nations.

# Additional Video Resources

Here are five video resources we think you will find both interesting and of personal value to understanding aspects of social psychology.

**WATCH**  The Milgram Obedience to Authority Study

This video shows classic footage from Milgram's most famous experiment: http://mediaplayer.pearsoncmg.com/assets/mypsychlab-Milgram_footage.

**WATCH**  Malala Yousafzai's Nobel Prize Lecture

The remarkable young Pakistani woman who courageously stood up for education—and was shot in the head by the Taliban for her actions—speaks eloquently in support of universal education. Watch her lecture here: https://www.youtube.com/watch?v=MOqIotJrFVM

**WATCH**  The Fast-Food Authority Hoax

Author Philip Zimbardo describes in detail the hoax that capitalized on the power of authority to perpetrate sexual abuse and examines some of the social psychological factors that can create this type of situation—and that also have the power to resist and reverse it. View the video here: https://www.youtube.com/watch?v=8mpAbig8ttY

**WATCH**  The Triumph of Evil: Genocide in Rwanda

This PBS page includes much information about the Rwandan genocide, including a timeline showing the degrees of involvement from the U.S. and U.N., as well as interviews, photos, a synopsis of the movie, and discussion forums. Watch the video here: http://www.pbs.org/wgbh/pages/frontline/shows/evil/

**WATCH**  Monica Lewinsky's TED Talk on Cyberbullying

One of the most-viewed TED talks in history, the former White House intern discusses the public shaming she experienced in the wake of her involvement with President Bill Clinton, and shares with great eloquence her personal story of cyberbullying. View the video here: http://www.ted.com/talks/monica_lewinsky_the_price_of_shame?language=en

# Chapter 12
# Psychological Disorders



In 1889, Vincent Van Gogh spent several months being treated for his mental problems here in the *Ward of Arles Hospital*.

## ⌄ Core Concepts

**12.1** The medical model views psychological disorders as "diseases," while the psychological view sees them as an interaction of biological, behavioral, cognitive, developmental, and social-cultural factors.

**12.2** The *DSM-5*, the most widely used system for classifying mental disorders, organizes them by their mental and behavioral symptoms.

**12.3** Ideally, accurate diagnoses lead to proper treatments, but diagnoses may also become labels that depersonalize individuals and ignore the social and cultural contexts in which their problems arise.

THE VOLUNTEERS KNEW THEY WERE ON THEIR OWN. IF THEY MANAGED to get admitted to the hospital, the five men and three women knew they would be treated as mental patients, not observers. None had ever been diagnosed with a mental illness, but perhaps they were not so "normal" after all: Would a normal person lie to get into such a place? In fact, all were collaborators in an experiment designed to find out whether normality would be recognized in a mental hospital.

The experimenter, David Rosenhan—himself one of the pseudopatients—suspected that terms such as *sanity*, *insanity*, *schizophrenia*, *mental illness*, and *abnormal* might

have fuzzier boundaries than the psychiatric community believed. He also suspected that some of the "abnormal" behaviors seen in mental patients might originate in the abnormal atmosphere of the mental hospital rather than in the patients themselves. To test these ideas, Rosenhan and his collaborators decided to see how mental health professionals would deal with patients who were, in fact, not mentally ill. Could they distinguish healthy people from those with mental disorders?

Individually, the volunteers applied for admission at different hospitals, complaining that they had recently heard voices that seemed to say "empty," "hollow," and "thud." Aside from this, they claimed no other symptoms. All used false names, and the four who were mental health professionals (including Rosenhan himself) gave false occupations—but, apart from these minor fibs, they answered all questions truthfully. They tried to act as normally as possible, even though the prospect of entering the alien hospital environment made them feel anxious. They also worried about *not* being admitted and—worse yet—exposed as frauds. That concern vanished quickly, for all readily gained admittance at 12 different hospitals (some did it twice). All but one were diagnosed with *schizophrenia*, a major psychological disorder often accompanied by hearing imaginary voices.

After admission, the "pseudopatients" made no further claims that they heard voices or had any other abnormal symptoms. Indeed, all wanted to be on their best behavior to gain release as soon as possible. Their only apparent "deviance" involved taking notes on the experience—at first privately and later publicly, when they found that the staff paid little attention. The nursing records indicated that, when the staff did notice, they interpreted the note taking as part of the patient's illness. (One bland comment: "Patient engages in writing behavior.")

For the most part, patients found themselves ignored by the staff—even when they asked for help or advice. But when the staff did interact with them, it was as though the patients were simply "cases," not persons. Consequently, it took an average of 19 days for the pseudopatients to convince the hospital staff that they were ready for discharge, despite the absence of abnormal symptoms. One unfortunate volunteer wasn't released for almost 2 months.

Two main findings from this classic study jarred the psychiatric community to its core.

First, *no professional staff member at any of the hospitals ever realized that any of Rosenhan's pseudopatients was faking mental illness.*

Of course, the staff may have assumed that the patients had been ill at the time of admission and had improved during their hospitalization. But that possibility did not let the professionals off Rosenhan's hook: Despite apparently normal behavior, not one pseudopatient was ever labeled

as "normal" or "well" while in the hospital. And, on discharge, they were still seen as having schizophrenia—but "in remission."

# Were the Hospital Staff Members Unskilled or Unfeeling?

Rosenhan didn't jump to that conclusion. Rather, he attributed their failure to recognize the pseudopatients' behavior as normal to being occupied with paperwork and other duties, leaving little time for observing and interacting with patients. The design of the psychiatric wards also contributed to the problem: Staff members spent most of their time in a glassed-in central office that patients called "the cage." As Rosenhan (1973a) said:

> It could be a mistake, and a very unfortunate one, to consider that what happened to us derived from malice or stupidity on the part of the staff. Quite the contrary, our overwhelming impression of them was of people who really cared, who were committed and who were uncommonly intelligent. Where they failed, as they sometimes did painfully, it would be more accurate to attribute those failures to the environment in which they, too, found themselves than to personal callousness. Their perceptions and behavior were controlled by the situation. (p. 257)

Could it be that the pseudopatients also got caught up in the system and weren't behaving as normally as they believed? Rosenhan noted: *To everyone's surprise, the other hospital patients readily detected the ruse, even though the professional staff did not.* The pseudopatients reported that the other patients regularly voiced their suspicions: "You're not crazy. You're a journalist or a professor… . You're checking up on the hospital." In his report, entitled "On Being Sane in Insane Places," Rosenhan (1973a) noted dryly: "The fact that the patients often recognized normality when staff did not raises important questions" (p. 252). You will hear the echo of these "important questions" in the Problem that threads through this chapter:

> **CHAPTER PROBLEM: Is it possible to distinguish mental disorder from merely unusual behavior? That is, are there specific signs that clearly indicate mental disorder?**

Rosenhan's study caused a tremendous flap, and many psychiatrists and clinical psychologists cried foul. Several ensuing responses in *Science*, the journal in which the study had been published, accused Rosenhan of slipshod research and of damaging the reputation of the mental health professions. Did they have a point? Was Rosenhan's study flawed? Or were their reactions simply the cries of those whose professional pride was wounded? It is important to note

that Rosenhan did not dispute the existence of psychological disorders. Rather, he raised questions about clinical judgments made in the context of mental hospitals. His study remains relevant even today, as practitioners continue to work to refine the process of diagnosing mental disorders.

It's a fact: Millions of people *do* experience the anguish of **psychopathology** (also called mental disorder or mental illness). According to the National Institute of Mental health (NIMH, 2010b), more than 26% of the U.S. population—more than 1 in 4 Americans—are diagnosed with mental health problems in a given year. For 1 in 17, it will be a mental illness of serious proportions, such as **major depression** or **schizophrenia**. Over their life spans, an estimated 46% of Americans will be diagnosed with some form of psychological disorder (Butcher and others, 2008). Let's explore the key issues involved in determining what constitutes mental disorder.

# Key Question: What Is Psychological Disorder?

> **Core Concept 12.1**
>
> **The medical model views psychological disorders as "diseases," while the psychological view sees them as an interaction of biological, behavioral, cognitive, developmental, and social-cultural factors.**

On the world stage, the picture of psychopathology is even more sobering. According to the World Health Organization, some 450 million people around the globe have mental disorders, with a large proportion living in poor countries that have no mental health care system (Miller, 2006c). Depression, for example, causes more disability among people aged 15 to 44 than any other condition except HIV/AIDS. In the United States, nearly half of all households have someone seeking treatment for a mental problem (Chamberlin, 2004).

Yet, as Rosenhan's study suggests, distinguishing "normal" from "abnormal" is not always a straightforward task. Consider, for example, how you would classify such eccentric personalities as Lady Gaga and Russell Brand, or the suicide of Robin Williams. And what about a soldier who risks his or her life in combat: Is that "normal"? Or, does a grief-stricken man have a psychological disorder if he is unable to return to his normal routine 6 months after his wife has died?

Initially, clinicians look for three classic symptoms of psychopathology: hallucinations, delusions, and extreme affective disturbances.

1. **Hallucinations** are false sensory experiences, such as hearing nonexistent voices or "seeing things." You may recall that that Rosenhan's pseudopatients claimed to have hallucinations in the form of voices saying "empty," "hollow," and "thud."

2. By contrast, **delusions** involve troublesome irrational beliefs. For example, if you think you are the president of the United States (and you are not), or if you think people are out to "get" you (and they are not), you probably have a delusional disorder.

3. The third classic symptom, **affective disturbances**, manifests itself as pathologies of emotion or *affect*. Accordingly, a person who usually feels depressed, anxious, or manic may have an affective disorder.

Beyond such extreme signs of distress, the experts do not always agree. What qualifies as abnormal becomes a judgment call, a judgment made more difficult because no sharp boundary separates normal from abnormal thought and behavior. It may be helpful to think of psychological disorder as part of a continuum ranging from the absence of disorder to severe disorder, as shown in Figure 12.1. The big idea here is that people with mental disorders are not in a class by themselves. Rather, their disorders are an exaggeration of normal responses.

In this section of the chapter, we will focus on two contrasting views of **psychopathology**.

- One, coming to us from medicine, we sometimes call the "medical model." It portrays mental problems as akin to physical disorders: as sickness or disease.

**Figure 12.1**  The Spectrum of Mental Disorder

Mental disorder occurs on a spectrum that ranges from the absence of signs of pathology to severe disturbances, such as are found in major depression or schizophrenia. The important point is that there is no sharp distinction that divides those with mental disorders from those who are "normal."

| No Disorder | Mild Disorder | Moderate Disorder | Severe Disorder |
|---|---|---|---|
| Absence of signs of psychological disorder | Few signs of distress or other indicators of psychological disorder | Indicators of disorder are more pronounced and occur more frequently | Clear signs of psychological disorder, which dominate the person's life |
| Absence of behavior problems | Few behavior problems; responses usually appropriate to the situation | More distinct behavior problems; behavior is often inappropriate to the situation | Severe and frequent behavior problems; behavior is usually inappropriate to the situation |
| No problems with interpersonal relationships | Few difficulties with relationships | More frequent difficulties with relationships | Many poor relationships or lack of relationships with others |

- The other view, a psychological view, sees psychopathology as the result of multiple factors that can involve both nature and nurture.

As our core concept for this section puts it:

> The medical model views psychological disorders as "diseases," while the psychological view sees them as an interaction of biological, behavioral, cognitive, developmental, and social-cultural factors.

The point is that the way we conceptualize psychopathology determines how we treat it—whether with drugs, charms, rituals, talk, torture, brain surgery, hospitalization, or commitment to an institution.

### WRITING PROMPT

**An Example of Moderate Disorder**

Look back at the three classic signs of severe mental disorder, along with the signs of abnormality shown in Table 12.1 and Figure 12.1. Based on some combination of those indicators, write a short description of a behavior pattern you would consider to be clearly abnormal. (Please make up your own example, rather than using one described in the text.)

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

By the end of this section, you will be able to:

**12.1**    **Compare the medical model with the psychological model of psychological disorders**

**12.2**    **List the main signs and symptoms of mental abnormality**

# 12.1:  Changing Concepts of Psychological Disorder

**Objective:**    **Compare the medical model with the psychological model of psychological disorders**

In the ancient world, people assumed that supernatural powers lurked everywhere, accounting for good fortune, disease, and disaster. In this context, they perceived psychopathology as a sign that demons and spirits had taken possession of a person's mind and body (Sprock & Blashfield, 1991). If you had been living in this ancient world, your daily routine would have included rituals aimed at outwitting or placating these supernatural beings. Indeed, some religious outliers believe, even today, that demons cause mental illness.

In about 400 B.C., the Greek physician Hippocrates took humanity's first step toward a scientific view of mental disorder by declaring that abnormal behavior has physical causes. Hippocrates taught his disciples to interpret the symptoms of psychopathology as an imbalance among four body fluids called "humors": blood, phlegm (mucus), black bile, and yellow bile. Those with an excess of black bile, for example, were inclined to melancholy or depression, while those who had an abundance of blood were "sanguine" or warm-hearted. With this simple but revolutionary idea, Hippocrates incorporated mental disorders into medicine, and his view—that mental problems had natural, not supernatural, causes—influenced educated people in the Western world until the end of the Roman Empire.

In the Middle Ages, superstition again eclipsed the Hippocratic model of mental disorder. Under the influence of the medieval Church, physicians and clergy reverted to the old ways of explaining abnormality as the work of demons and witches. In those harsh times, the belief that Satan caused unusual behavior heaped fuel on the fires of the Inquisition. The "cure" involved attempts to drive out the demons that possessed the unfortunate victim's soul—literally, "beating the Devil" out of the supposedly possessed. As a result, thousands of mentally tormented people were tortured and executed all across Europe.

As late as 1692, the medieval view of mental disorder led frightened colonists in Massachusetts to convict—and execute—a number of their fellow citizens for witchcraft (Karlsen, 1998). What frightened them? A group of young girls had unexplained "fits" that neighbors interpreted as the work of witches. A modern analysis of the witch trials has concluded that the girls were probably suffering from poisoning by a fungus growing on rye grain—the same fungus that produces the hallucinogenic drug LSD (Caporeal, 1976; Matossian, 1982, 1989).

## 12.1.1:  The Medical Model

In the latter part of the 18th century, the "disease" view that had originated with Hippocrates reemerged with the rise of science. The resulting **medical model** held that mental disorders are *diseases* of the mind that, like ordinary physical diseases, have objective causes and require specific treatments. People began to perceive individuals with psychological problems as sick (suffering from illness) rather than as immoral or demon-possessed.

And what a difference a new theory made! Treating mental diseases with torture and abuse made no sense. The new view of mental illness brought human reforms that called for placing the "insane" in protective "asylums." In this supportive atmosphere, many patients actually improved—even thrived—on rest, contemplation, and

simple but useful work (Maher & Maher, 1985). Unfortunately, political pressures eventually turned the initially therapeutic asylums into overcrowded warehouses of neglected patients.

Despite such problems, the revived medical model was unquestionably an improvement over the old demon model. Nevertheless, modern psychologists think we are ready for yet another revolutionary change in perspective. In their view, the medical model has shortcomings of its own.

Psychologists argue that the assumption of "disease" leads to a doctor-knows-best approach, in which the therapist takes all the responsibility for diagnosing the illness and prescribing treatment. Under this "disease" assumption, the patient may become a passive recipient of medication and advice rather than an active participant in treatment. In fact, many mental patients today are treated simply by the dispensing of pills. Psychologists believe that this attitude wrongly encourages dependency on the doctor, encourages unnecessary drug therapy, and does little to help the patient develop good coping skills and healthy behaviors.

Incidentally, a doctor-knows-best approach also makes mental illness a *medical* problem, taking responsibility (and business!) away from psychologists and giving it to **psychiatrists**. Understandably, psychologists bristle at the medical model's implication that their treatment of mental "diseases" should be done by physicians or under the supervision of physicians. In effect, the medical model assigns psychologists to second-class professional status. As you can see, ownership of the territory of mental disorder is hotly contested.

## 12.1.2: Psychological Models

What does psychology have to offer in place of the medical model? Most clinical psychologists have now turned to combinations of perspectives that derive from behaviorism, cognitive psychology, developmental psychology, social learning, and biological psychology.

**PSYCHOLOGICAL ALTERNATIVES TO THE MEDICAL MODEL** Modern psychologists agree with proponents of the medical model that biology can influence mental disorder. A **biological perspective** is certainly required to account for the genetic influences we see in schizophrenia, the anxiety disorders, intellectual disability, and many other conditions. But psychological alternatives to the medical model also take into account behavioral, cognitive, developmental, and social-cultural factors that the medical perspective tends to neglect.

The **behavioral perspective** looks outward, emphasizing the influence of the environment. Thus, behavioral psychology tells us that many abnormal behaviors can be

### Figure 12.2

The *biological perspective* is one of several alternatives to the medical model. Others include the *behavioral perspective*, *cognitive perspective*, *social perspective*, and *developmental perspective*.



acquired in the same way that we learn healthy behaviors—through behavioral learning. This view helps us focus on the environmental conditions that maintain abnormal behaviors: rewards, punishments, and contingencies. For example, the behavioral perspective would suggest that a fear of public speaking could result from a humiliating public speaking experience and subsequent avoidance of any opportunity to develop and be reinforced for public speaking skills.

In contrast, the **cognitive perspective** looks inward, emphasizing mental processes, including thoughts, feelings, perceptions, and memory. Cognitive psychology focuses on such questions as these: How do people interpret events? Do they believe that they have control over their own lives (an *internal* or *external locus of control*)? How do they cope with threat and stress? Do they regularly experience troublesome emotions, such as depression or anxiety?

**Social-learning** theorists and others have built bridges that link the cognitive and behavioral perspectives. Both sides of that divide now acknowledge that cognition and behavior usually occur in a social context, requiring a **sociocultural perspective**. Through that lens, a psychologist might ask about a client's cultural context and social support system, as well as social sources of stress on the job, at school, or from family and friends.

Yet another view, the **developmental perspective** looks for deviations from the expected pattern of biological and psychological development. Did a child begin to use language, as expected, during the second year of life? Does she have a functional **theory of mind** that allows her to understand other people's thoughts and intentions? Is her emotional control appropriate to her age? Such questions help the clinician identify and treat developmental disorders such as autism and intellectual disability.

Albert Bandura typifies those who combine the social, behavioral, and cognitive perspectives: His concept of **reciprocal determinism** suggests that behavior, cognition, and social/environmental factors all mutually influence each other through social learning, behavioral learning, and cognitive learning (Figure 12.3).

## Figure 12.3

*Reciprocal determinism* is the process by which our cognitions, behaviors, and environments mutually influence each other.



## Figure 12.4 The Biopsychology of Mental Disorder

An explosion of research in neuroscience implicates a host of possible biological factors in psychopathology.



Thus, a fear of public speaking, for example, could have its origins in *social learning* when you heard people talk about "stage fright" and their anxiety about public speaking. Against that backdrop, then, you may have had an unpleasant *behavioral learning* experience in which people laughed at you while you were making a speech. That experience, in turn, could easily make you view yourself as "a poor public speaker"—as a result of *cognitive learning.* A result of this chain of social learning, behavioral learning, and cognitive learning—in which each step *reciprocally* reinforces the others—is the idea that public speaking is a fear-producing experience.

**PUTTING THE PERSPECTIVES TOGETHER: THE BIO-PSYCHOLOGY OF MENTAL DISORDER**   Although most psychologists have reservations about the medical model, they do agree that biology influences thought and behavior. An explosion of recent research in neuroscience confirms the role of the brain as a complex organ whose mental functions depend on a delicate balance of chemicals and neural circuits that are continually modified by our experiences. Genetic and **epigenetic** influences, brain injury, stress, hormones, and infection are still other factors that can tip the biological balance toward **psychopathology** (see Figure 12.4).

Thus, modern **biopsychology** assumes that many mental disturbances involve not only cognitive, behavioral, developmental, and social-cultural factors but also the brain and nervous system (Insel, 2010).

On the **heredity** front, the Human Genome Project has specified the complete human genetic package. This massive study, extending over several years, has identified and mapped all the genes on all our chromosomes (although we are only beginning to understand their functions). Many psychologists see this accomplishment as a ripe opportunity for specialists in behavioral genetics who are searching for genes associated with specific mental disorders (NIMH, 2003). But the search hasn't been

easy. So far, suspicious genetic abnormalities have been linked to schizophrenia, bipolar disorder, anxiety disorders, and autism, yet their exact roles in these conditions remain unclear. Most experts believe that such disorders are likely to result from multiple genes interacting with environmental factors, such as toxins, infections, or stressful events.

Scientists have also discovered how some mental disorders are influenced by epigenetic factors, which involve an interaction of heredity and environment. Epigenetics involves the modification of gene expression by chemicals that turn our chromosomes on and off. These changes result from the brain's responses to experience, especially a stressful experience, and also from environmental toxins that affect the brain. These epigenetic effects have been found in a number of disorders, including depression, schizophrenia, bipolar disorder, autism, and Alzheimer's disease (Iwamoto & Kato, 2009; Kato and others, 2005; Weir, 2012).

But let us be clear about the role of biology in mental disorder: Whatever neuroscience discovers in the future, biology will never account for everything. A *psychological perspective* says that our thoughts and behaviors are always a product of nature *and* nurture—biology *and* experience.

# 12.2: Indicators of Abnormality

**Objective:**   **List the main signs and symptoms of mental abnormality**

While clinicians sometimes disagree about the *etiology* (causes) of psychological disorders, they usually agree broadly on the signs and symptoms of abnormality (Rosenhan & Seligman, 1995).

I find students also are very interested in what it means to be, quote unquote, "crazy."

People worry that having mental problems means "going crazy," but that is mistaken—for several reasons.

## 12.2.1:  What Are These Indicators?

Earlier we noted that **hallucinations**, **delusions**, and **extreme affective disturbances** are signs of severe mental disorder. But many psychological problems don't reveal themselves so obviously. Accordingly, clinicians also look for the more subtle indicators of mental disturbances found in Table 12.1.

Please note that *none* of these criteria apply to *all* forms of psychological disorder. We especially want to disabuse readers of the idea that everyone with mental issues is "crazy"—in the sense of irrational speech, bizarre behavior, or "seeing things." Another erroneous idea is that most people with mental disorders are potentially violent. Not so: In fact, only rarely do people with mental problems become "deranged and dangerous" (Arkowitz & Lilienfeld, 2011).

## But is the presence of just one indicator enough to demonstrate abnormality?

It's a judgment call. Clinicians feel more confidence in labeling behavior as "abnormal" when they see two or more signs of abnormality. (You will remember that the pseudopatients in Rosenhan's study presented only *one* symptom: hearing voices.) The more extreme, numerous, or frequent the indicators of abnormality, the more confident psychologists can be about identifying a mental disorder.

Even with these indicators, the clinician still must decide *which* disorder it is. This can be tricky, because *psychopathology* takes hundreds of forms. Some diagnoses may have a familiar ring: **depression**, **phobia**, and **panic disorder**. You may be less well acquainted with others, such as **conversion disorder** or **borderline personality disorder**. In all, you will find more than 300 specific varieties of psychopathology described in the *Diagnostic and Statistical Manual of Mental Disorders (5th edition)*, known by clinicians and researchers as the *DSM-5*. Even though it has a strong medical-model bias, mental health professionals of all backgrounds use this handbook to diagnose psychopathology.

## 12.2.2:  Gender Differences in Mental Disorders

No one knows exactly why, but the data show large gender differences in susceptibility to various mental disorders (Holden, 2005). We have seen, for example, that women more often than men are diagnosed with mood disorders, especially depression. Women also are the majority among those having anxiety disorders and eating disorders. But men don't get a pass: They are overwhelmingly more likely to have personality disorders that involve aggressive or self-control issues, such as drug and alcohol abuse and violence. Thus men, far more often than women, are diagnosed as having antisocial personality disorder. As we have noted, one possibility is that social norms encourage more women than men to report feelings of depression. At the same time, social norms may encourage men to "act out" their feelings in a more physical manner.

**Table 12.1**  Indicators of Mental Disturbances

| Indicators of Mental Disturbances | Description |
| --- | --- |
| Anxiety or distress | Does the individual show unusual or prolonged levels of unease or nervousness? Everyone experiences distress or anxiety occasionally, so this indicator suggests a mental disorder only when it is prolonged or without apparent cause. |
| Maladaptiveness | Does the person regularly act in ways that interfere with his or her well-being or that make others fearful? Threats of suicide, outbursts of uncontrollable anger, heavy drinking, or reckless driving are signs of maladaptiveness, as is any other behavior that interferes with the ability to function effectively and occurs frequently. |
| Irrationality | Does his behavior often show a disregard for the consequences or seem out of his control? Is her speech incomprehensible or nonsensical babbling? Are his behaviors or emotional responses often inappropriate to the situation? |
| Unpredictability | Does the individual behave erratically and inconsistently at different times or from one situation to another? |
| Behavior suggesting lack of awareness of social norms or the sensibilities of other persons | Does the behavior flagrantly violate social norms, breaching the boundaries of legally or morally acceptable actions? Does the individual show a lack of understanding or awareness of others' feelings? Being merely unusual or unconventional, however, is not a sign of abnormality. Nor is civil disobedience as part of political protest. |

Some gender differences apparently originate in biology. For example, men's brains seem to be more strongly *lateralized* (that is, they tend to have specific cortical functions more localized on one side of the brain or the other). This may explain why men are less likely than women to recover language after a left-side stroke. Some neuroscientists also suspect that the "one-sidedness" of the male brain may contribute to the much higher incidence of schizophrenia and most developmental disorders, such as autism, ADHD, and specific learning disorders in males (Holden, 2005). Similarly, there may be some as-yet undiscovered biological difference that underlies women's greater susceptibility to depression. Unfortunately, deciding between the social and biological explanations for gender differences in mental disorders awaits further research. Don't be surprised, however, if the final answer reflects the nature–nurture interaction: It probably involves both.

## 12.2.3: A Caution to Readers

As you read about the symptoms of psychological disorder, you may begin to wonder about your own mental health. All students studying abnormal psychology face this hazard.

To see what we mean, let's analyze the following questions (Table 12.2), which are based on the indicators of abnormality discussed earlier. The point is that some undesirable behaviors can be so mild and so common, in otherwise healthy people, that they do not rise to the level of "abnormality."

**Table 12.2** Questions Based on Indicators of Abnormality

| Questions | Indicator of Abnormality |
| --- | --- |
| Have you had periods of time when you felt "blue" for no apparent reason? | Distress |
| Have you gone to a party when you knew you should be studying? | Maladaptiveness |
| Have you had an experience in which you thought you heard or saw something that wasn't really there? | Irrationality |
| Have you had a flash of emotion in which you said something that you later regretted? | Unpredictability |
| Have you had unusual thoughts that you told no one about? | Unconventionality |
| Did someone become fearful or distressed because of something you said or did? | Maladaptiveness |

The fact is that almost everyone will answer "yes" to at least one—and perhaps all—of these questions. Yet this does not necessarily mean abnormality. Whether anyone is normal or abnormal is a matter of degree and frequency—and clinical judgment.

So, as we talk about specific psychological disorders, you will most likely find some symptoms that you have experienced. Your classmates will, too. (A similar problem is common among medical students, who begin to notice that they have symptoms of the physical diseases they are studying.)

You should realize that *this is normal*. Another reason, of course, that you may see yourself in this chapter arises from the fact that no sharp line separates psychopathology from normalcy. Psychological disorders involve exaggerations of normal tendencies. Nevertheless, we do not suggest that concerns about psychological disorder should be taken lightly. If, after reading this chapter, you suspect that you may have a significant problem, you should discuss it with a professional.

### Psychology Matters

## The Plea of Insanity: How Big Is the Problem?

Now let's take a detour to view mental disorder in a legal context—as we examine the *plea of insanity.* We begin with two questions. First:

**Does the insanity plea excuse criminal behavior and allow thousands of dangerous people to go back on the streets? Yes or No?**

Now, before you read about the insanity defense below, we ask for a guess:

**How often is the plea of insanity used?** Try to guess the approximate percentage of accused criminals in the United States who use a plea of insanity in court: _____%.

You will find the correct answers to these questions in the text below. An answer within 10% indicates that you have an exceptionally clear grasp of reality! But before we give you the answers, let's take a critical look at the history of the insanity defense.

In 1843, Daniel M'Naughten, a woodcutter from Glasgow, Scotland, thought he had received "instructions from God" to kill the British prime minister, Robert Peel. Fortunately for Peel, this would-be assassin struck down his secretary by mistake. Apprehended and tried, M'Naughten was found "not guilty by reason of insanity." The court reasoned that M'Naughten's mental condition prevented him from knowing right from wrong. The public responded with outrage. Fast-forwarding 138 years, a similarly outraged public decried the modern-day insanity ruling involving John Hinckley, Jr., the young man who shot and wounded then-President Ronald Reagan.

Such infamous cases have molded a low public opinion of the insanity defense. The citizenry blames psychologists and psychiatrists for clogging the courts with insanity pleas, allowing homicidal maniacs back on the streets, and letting criminals go to hospitals for "treatment" instead of prisons for punishment. But this public image of insanity rests on several mistaken assumptions.

For one, "insanity" appears nowhere among the *DSM-5* listing of disorders recognized by psychologists and psychiatrists. Technically, *insanity* is neither a psychological nor psychiatric term. Rather, it is a *legal* term, which only a court—not psychologists or psychiatrists—can officially apply. By law in most states, insanity can include not only psychosis but also

jealous rage, intellectual disability, and a wide variety of other conditions in which a person might not be able to control his or her behavior or distinguish right from wrong (Mercado, 2006; Thio, 1995).

**So, why can we not simply abolish the laws that allow this legal technicality?**

The answer to that question turns on the definition of a crime. Holding a person responsible for a crime requires that two criteria be met: (a) the person has committed an *illegal act* (just wanting to commit a crime is not enough) and (b) the person has *intentionally* done so. Merely wishing your boss dead is no crime (because you committed no illegal act). Neither is running over your boss accidentally when he steps in front of your moving car in the parking lot (because it wasn't intentional). But if you *plan* to run down the dastardly dude and then *actually do so*, you have committed an intentional and illegal act—and the courts can convict you of murder. Now you can see why no one wants to give up the legal requirement of *intent*. But you can also see why an exception for intent leaves the door open for the controversial plea of insanity.

With these things in mind, take a moment to recall your estimate of the percentage of accused criminals who actually use the insanity plea.

In reality, accused criminals resort to the insanity defense far less often than the public realizes. In actuality, it occurs in less than 1% of criminal cases, and of this tiny number, only a fraction are successful (Chiaccia, 2007)—although we would note that it has been tried *unsuccessfully* in several famous murder cases, including those of David Berkowitz, Ted Bundy, Charles Manson, John Wayne Gacy, Jeffrey Dahmer, and Dan White (infamous for the "Twinkie defense," claiming that a diet of sugary foods had made him homicidal). To repeat: The insanity defense was *not successful* in any of those cases.

# Key Question: How Are Psychological Disorders Classified in the *DSM-5?*

## Core Concept 12.2

**The *DSM-5*, the most widely used system for classifying mental disorders, organizes them by their mental and behavioral symptoms.**

In much the same way a bookstore organizes its collection by themes (mystery, romance, etc.), the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.) brings some order to the world of psychopathology by placing some 300 mental disorders into 22 diagnostic categories.

Usually called simply the *DSM-5*, this manual represents the most widely used system for classifying psychopathology in the United States. It is important to note that the *DSM-5* does *not* classify most disorders by *cause*, since the causes of most mental disorders remain either

unknown or in dispute. Instead, as our core concept for this section states:

> The *DSM-5*, the most widely used system for classifying mental disorders, organizes them by their mental and behavioral symptoms.

With so many disorders described in the *DSM-5*, it would be impossible to cover them all here. Instead, we will focus this chapter on those you are most likely to encounter either in daily life or in the study of psychopathology in more advanced courses.

By the end of this section, you will be able to:

**12.3** Describe the main features of the new DSM-5

**12.4** Indicate the main types of depressive disorder, their incidence, and the factors that seem to cause them

**12.5** Distinguish bipolar disorder from the depressive disorders. Indicate why we think biology plays a role in bipolar disorder

**12.6** Distinguish among the three types of anxiety disorders described

**12.7** Explain the difference between an obsession and a compulsion, and list the main factors causing OCD

**12.8** Distinguish between illness anxiety disorder and conversion disorder

**12.9** Identify the common factor that distinguishes the dissociative disorders

**12.10** Describe the factors that distinguish schizophrenia and related disorders. Also indicate the possible causes that are being explored

**12.11** List the neurodevelopmental disorders discussed, along with their distinguishing characteristics

**12.12** Describe the alternatives to the DSM-5 that are currently being developed

# 12.3: Overview of the DSM-5 Classification System

**Objective:** Describe the main features of the new DSM-5

The *DSM-5* has two great virtues.

- First, it lays out specific criteria for diagnosing each of the 300+ mental disorders.

- And second, it gives practitioners a common language for the description of psychopathology.

Even though the manual was developed primarily by psychiatrists, its terminology has been adopted by clinicians of all stripes, including psychiatrists, psychologists, and social workers. In addition, most health insurance companies use *DSM-5* standards in determining what treatments they will pay for—a fact that gives this manual enormous economic clout.

The fifth edition of the *DSM* represents a decided improvement on the previous edition, published some 20 years earlier. As you may have surmised from its origins in psychiatry, the *DSM-5* has close ties to the medical model of mental illness. Its language is the language of medicine—symptoms, syndromes, diagnoses, and diseases. (Note: It contains no diagnosis of "normal.") But primarily, the authors sought to provide a *reliable* basis for diagnosis; that is, their goal was to make the criteria for diagnosing mental disorders clear and precise enough that, no matter which clinician a patient saw, the diagnosis would be the same.

Early versions of the *DSM* had a distinctly Freudian flavor. The new *DSM-5*, however, generally manages to avoid endorsing particular theories of cause or treatment. It also differs from early versions of the *DSM* by giving extensive and specific descriptions of the symptoms of each disorder.

- Among the improvements that your authors find especially praiseworthy include the acknowledgement that *mental disorders can change over the life span*. So, for example, the *DSM-5* recognizes that depression in a 12-year-old is not the same as depression in a 60-year-old.
- The *DSM-5* also gives increased recognition to the fact that *the symptoms and course of mental disorders exhibit gender differences.*
- In yet another improvement, it recognizes that *mental problems do not fall into discrete categories, but rather lie on a spectrum from "normal" to dysfunctional*; that is, people with mental disorders may be different from the rest of us in degree, but not in kind.
- Further, the *DSM-5* now recognizes that *certain symptoms (e.g., anxiety and depression) may be found in various mental disorders.*
- Finally, the *DSM-5* says that *most patients present symptoms of multiple disorders.*

In general, the committees that put together the new classification scheme did their best not only to acknowledge the limitations of our knowledge but to base the new "psychiatric bible" on the best available science.

Another improvement in the *DSM-5* banished the term **neurosis** (although you will frequently hear it used in casual conversation among mental health professionals). Originally, a neurosis or neurotic disorder was conceived of as a relatively common pattern of subjective distress or self-defeating behavior that did not show signs of brain abnormalities or grossly irrational thinking. In short, a "neurotic" was someone who might be unhappy or dissatisfied but *not* considered dangerously ill or out of touch with reality.

Similarly, **psychosis** was originally thought to differ from neurosis in both the quality and severity of symptoms. Clinicians no longer conceive of psychosis as a more severe form of neurosis but as a distinct condition. The *DSM-5* reserves the term *psychosis* for disorders that involve loss of contact with reality.

There is one final point we want to make about the DSM before digging into our study of disorders. Although the majority of everyday psychological problems involve making choices and dealing with confusion, frustration, and loss, the *DSM-5* gives these issues short shrift under the awkward label, *Other Conditions That May Be a Focus of Clinical Attention.* This category represents a catch basin for relatively mild problems that do not fit well under other headings. Here we find a diverse collection of concerns that include marital problems, academic problems, job problems, parent–child problems, and even *malingering* (faking an illness). Consequently, the largest group of people diagnosed with mental problems may fit these headings—even though the *DSM-5* devotes disproportionately little space to them. Ironically, because these adjustment difficulties are so prevalent, they make up a large portion of the clientele for private mental health practitioners.

With these points in mind, then, let us now turn to a sampling of disorders described in the *DSM-5.* A look at the chart accompanying our discussion of each of the major diagnostic categories will give you an overview of the scheme the manual uses to classify these disorders. We begin with those that involve sustained extremes of negative affect: the *depressive disorders.*

# 12.4:  Depressive Disorders

**Objective:**  **Indicate the main types of depressive disorder, their incidence, and the factors that seem to cause them**

Who has never received a bad grade, played on a losing team, lost a loved one, or been rejected by a romantic partner?

Everyone experiences occasional strong, unpleasant, emotional reactions. Emotional lows are a normal part of living. However, when these low moods persist for days or even weeks at a time, preventing us from carrying out the tasks of daily living, something is seriously wrong, and the diagnosis will probably be one of the **depressive disorders**—of which we will consider two:

- Major Depression
- Major Depressive Disorder with Seasonal Pattern

I'm really interested in hearing about what it feels like to be depressed. What does it

What does depression feel like?

### 12.4.1: Major Depression

Most people who feel depressed for extended periods have a condition called major depression or **major depressive disorder**—among the commonest of all major mental disturbances. Not all depressive episodes are so severe, of course. The *DSM-5* covers these with diagnoses such as *recurrent brief depression* and *short-duration depressive episode*.

### 12.4.2: Incidence

Psychologist Martin Seligman (1973, 1975) has called depression the "common cold" of psychological problems. In the United States, it accounts for the majority of all mental hospital admissions. Depression is also the stuff of "the blues"—so common that it has produced a whole genre of music. Even if you have not had major depression, chances are that you have experienced depression in one of its milder or shorter forms. In fact, many clinicians believe that depression, in all its incarnations, is vastly underdiagnosed and undertreated (Kessler and others, 2003; Robins and others, 1991).

The National Institute of Mental Health (NIMH) (2006) estimates that depression costs Americans about $83 billion each year, including the costs of hospitalization, therapy, and lost productivity. But the human cost cannot be measured in dollars alone. Countless people in the throes of depression may feel worthless, lack appetite, withdraw from friends and family, have difficulty sleeping, lose their jobs, and become agitated or lethargic. In severe cases, they may also have psychotic distortions of reality.

Some see a burgeoning "epidemic" of depression, reflected in a higher lifetime incidence of depression among young people, ages 18 to 29, than among older individuals (Kessler and others, 2005a).

What could be causing this? Psychologist Jonathan Rottenberg speculates that it stems from "too much work, too much stimulation, and too little sleep," along with too-high expectations, growing substance abuse, and other social pressures of life in the 21st century (Rottenberg, 2014).

Most worrisome of all, suicide claims 1 in 50 people with major depression (Bostwick & Pankratz, 2000). Significantly, a person with major depression faces a significant suicide risk both on the way down in a depressive episode and on the upswing. In fact, the risk of suicide is greater during these swings of mood than during the deepest phase of the depressive cycle. Why? Because, in the depths of depressive despair, a person may have no energy or will to do *anything*, much less carry out a plan for suicide. Other factors may compound the risk as well. Abuse of alcohol (often used as self-prescribed medication to blunt the depression) or other drugs multiplies the likelihood of suicide, as do poor impulse control, chronic physical diseases, and certain brain abnormalities (Ezzell, 2003; Springen, 2010).

Your authors advise that a suicide threat always be taken seriously, even though you may think it is just a bid for attention—and even if you see no other signs of depression. But don't try to do therapy by yourself. You should direct any person who suggests he or she is thinking about suicide to a competent professional for help. If you need help and don't know who to call, check with your school's counseling department, your psychology professor, or your local mental health hotline for a referral.

You can give yourself a quick evaluation for signs of depression in the following box.

## Do It Yourself!
## A Depression Check

Most people think that depression is marked by outward signs of sadness, such as weeping. But depression affects other aspects of thought and behavior, as well.

**Directions:** For a quick check on your own tendencies to depression, self-examine your responses to each of the following questions.

Choose Yes or No for each response.

| No. | Responses | Yes | No |
|-----|-----------|-----|-----|
| 1. | Do you feel sad, hopeless, or guilty most of the time? | | |
| 2. | Do former friends avoid spending time with you? Or, do you feel you have lost interest in activities, events, and people around you? | | |
| 3. | Have you experienced any major change in appetite or body weight, though not from dieting? | | |
| 4. | Do you often feel restless or have difficulty sleeping, especially because of thoughts racing through your mind? | | |
| 5. | Do you feel more sluggish and fatigued than you ought to? | | |

| No. | Responses | Yes | No |
|-----|-----------|-----|-----|
| 6. | Do you spend excessive amounts of time sleeping? | | |
| 7. | Do you spend a lot of time "ruminating" about unhappy experiences you have had or mistakes you have made? | | |
| 8. | Have you been finding it increasingly difficult to think or concentrate? | | |
| 9. | Do you have recurrent thoughts of death or suicide? | | |
| 10. | Do you spend a great deal of time engaging in "escape" activities that help you avoid important issues in your life? (These might include excessive time spent playing video or computer games, reading, or alcohol consumption.) | | |

## 12.4.3: Cross-Cultural Comparisons

Studies reveal depression as the single most prevalent form of disability around the globe (Holden, 2000), although the incidence varies widely, as Table 12.3 shows.

**Table 12.3** Lifetime Risk of a Depressive Episode Lasting a Year or More

| | |
|---|---|
| Taiwan | 1.5% |
| Korea | 2.9% |
| Puerto Rico | 4.3% |
| United States | 5.2% |
| Germany | 9.2% |
| Canada | 9.6% |
| New Zealand | 11.6% |
| France | 16.4% |
| Lebanon | 19% |

Some of the variation across cultures may be the result of differences in reporting depression and in readiness or reluctance to seek help for depression. Other factors seem to be at work, too. For example, the stresses of war have undoubtedly inflated the rate of depression in the Middle East (Thabet and others, 2004). Meanwhile, Taiwan and Korea have remarkably *low* rates of depression, which reflect their low rates of marital separation and divorce—factors known to be associated with high risk of depression in virtually all cultures. In fairness, we should note a minority view holding that depression is overdiagnosed, because clinicians attach the label to people having a normal reaction to misfortune and because drug companies relentlessly push pills as the answer to life's unhappiness (Andrews & Thompson, 2009, 2010).

## 12.4.4: Biological Basis of Major Depression

Scientists have collected many pieces of the depression puzzle that show a biological basis for the disorder. But no one has managed to put all the pieces together into a big picture with which everyone agrees. Here are some of those puzzle pieces:

- We know that many cases of depression have a genetic origin, because severe bouts with depression tend to run in families (Plomin and others, 1994). A few observers even suggest that a genetic tendency for depression, at least in a mild form, may have even been adaptive in our evolutionary past because mild depression and worry helped people focus intently on problems that affected survival (Andrews & Thompson, 2009, 2010; Rottenberg, 2014). Indeed, we often find that people diagnosed with depression cannot take their minds off their troubles—a process called **rumination**.

- Research suggests that external biological agents, such as a viral infection, may also cause depression (Bower, 1995b; Neimark, 2005). Corroboration comes from signs of inflammation that show up in the brain scans of depressed patients (Centre for Addiction and Mental Health, 2015).

- Depression may also involve **neurotransmitter** abnormalities in the brain. We believe this to be true because many patients with depression respond favorably to drugs that affect the brain's supply of norepinephrine, serotonin, and dopamine (Ezzell, 2003). Remarkably, these antidepressant medicines also stimulate growth of new neurons in the **hippocampus** (Insel, 2007). A caution: This is **correlational** , so we cannot be sure that neuron growth is the factor that makes these medicines effective. Still, this makes sense in light of studies showing that stress can both suppress the growth of neurons in the hippocampus *and* precipitate a depressive episode (Jacobs, 2004).

- EEG recordings also show abnormal brain wave patterns in depressed patients—specifically, lower brain wave activity in the left frontal lobe (Davidson, 1992a, 1992b, 2000a; Robbins, 2000).

- Recently, neuroimaging has revealed a link between the amygdala (a part of the brain's "fear circuit") and a region in the frontal lobes known as *area 25*, located just over the roof of the mouth. In depressed patients, this patch of cortex paradoxically shows up on scans as "hot," says neuroscientist Helen Mayberg (Dobbs, 2006b; Insel, 2010; Mayberg, 2006, 2009). On the other hand, successful therapies for depression—be they drugs or psychotherapy—suppress activity in area 25.

No one is sure exactly what area 25 is or exactly how it works, although Dr. Mayberg suspects that it acts as a sort of "switch" connecting the conscious "thinking" portions of the frontal lobes and the brain's unconscious "alarm system." She also believes that area 25 does not act alone but rather interacts with a whole suite of brain modules that, together, produce depression. So, although Mayberg has fingered area 25, she says that we should not think of depression as a disor-

**Figure 12.5** Mayberg's Model of Depression

In this view, depression results from an interplay of three major factors: (a) the brain's mood-regulating circuitry, (b) external stressors, and (c) biological vulnerability.



der of that particular region in the brain. Rather, it involves a malfunctioning *system* of structures in the cortex, subcortex, and limbic system, along with imbalances in the neurotransmitters serving these regions. She argues that depressive episodes occur when a person with a defect in this complex mood-regulating system encounters stress (see Figure 12.5).

## 12.4.5: Psychological Factors in Major Depression

As with most other disorders, we cannot explain depression entirely in biological terms. We must also understand it as a mental, social, and behavioral condition. Considerable evidence implicates stressful events, such as losing a job or the death of a loved one, as common factors precipitating depression (Monroe & Reid, 2009).

**RUMINATION** Low self-esteem and a pessimistic attitude can add fuel to a cycle of depressive thought patterns (Figure 12.6). Psychologists call this **rumination**: an incessant mental replay of negative thoughts (Nolen-Hoeksema and others, 2008). While the downward spiral of depression may initially attract attention and sympathy, it eventually turns people away, leaving the depressed individual isolated and even more distressed (see Figure 12.4).

**Figure 12.6:** The Cognitive–Behavioral Cycle of Depression

**Figure 12.7** Relationship Between Light and Seasonal Depression



**LEARNED HELPLESSNESS** Probably because of low self-esteem, depression-prone people are more likely to perpetuate the depression cycle by attributing negative events to their own personal flaws or external conditions that they feel helpless to change (Azar, 1994). Martin Seligman calls this learned helplessness. These negative self-attributions, then, feed the cycle of depression and despair (Coyne and others, 1991).

**GENDER DIFFERENCES** No one knows why women have higher depression rates than do men (Holden, 2005). According to Susan Nolen-Hoeksema (2001), the difference may lie in the differing responses to sadness. When women experience sadness, she says, they tend to focus on the possible causes and consequences. In contrast, men attempt to distract themselves from feelings of depression, either by shifting their attention to something else or by doing something physical that will take their minds off their mood. This model suggests, then, that women ruminate more about their troubles, which increases their vulnerability to depression (Shea, 1998). Another possible source of the gender discrepancy in depression may involve norms that encourage women to seek help but discourage men from doing so.

**AGE DIFFERENCES** In addition to gender, age is also a factor in depression. According to NIMH (NIMH, 2010a), depression is more common among young adults than among those over 60. While the average age of onset is about 32 years of age, a large U.S. survey found that the likelihood of depression begins a sharp increase between 12 and 16 years (Hasin and others, 2005). The same study also found elevated rates of the disorder among Baby Boomers.

## 12.4.6: Major Depressive Disorder with Seasonal Pattern

Adding to the puzzle of depression is a special form of the disorder that occurs primarily during the dark winter months among people living in high latitudes (Insel, 2010; Lewy and others, 2006). Formerly known as *Seasonal Affective Disorder (SAD)*, the *DSM-5* now employs the rather cumbersome label

**major depressive disorder with seasonal pattern**. For this we know the cause: lack of sunlight, resulting in low levels of the hormone melatonin, which is regulated by special light-sensitive cells in the retina. (Yes, some blind people do develop seasonal depression!) You can see this link between sunlight and depression in the graph shown in Figure 12.7.

Daily fluctuations in melatonin regulate our internal biological clocks and our sleep–wakefulness cycle (Steele & Johnson, 2009). Based on this knowledge, researchers have developed a simple and effective therapy to regulate the hormone by exposing those with seasonal depression to daily doses of bright artificial light. Therapists report that combining light therapy with cognitive–behavioral therapy or antidepressants works even better (DeAngelis, 2006).

# 12.5: Bipolar Disorder

**Objective:** **Distinguish bipolar disorder from the depressive disorders. Indicate why we think biology plays a role in bipolar disorder**

The other common affective disturbance we will consider involves extreme swings of mood. The periods of depression and lethargy and the periods of extreme elation, along with agitation or hyperactivity, represent the two "poles" of **bipolar disorder**. The older term for this condition is *manic–depressive disorder*.

- During the **manic phase**, the individual becomes euphoric, energetic, hyperactive, talkative, and emotionally wound tight like a spring. Failures of good judgment are common, as well. It is not unusual for people swept up in mania to spend their life savings on extravagant purchases, to have casual, unprotected sexual liaisons, or to engage in other risky and frisky behaviors. Then, when the mania wanes, they must deal with the damage created during the wild and frenetic period.

- Soon, the **depressive phase** follows, bringing a dark wave of melancholy that sweeps over the mind. In this phase, the symptoms mimic those of major depression

(sometimes called "unipolar" depression). Biologically speaking, however, these two forms of depression differ: We know this because the antidepressant drugs that work well on major depression don't usually help victims of bipolar disorder—sometimes they even make it worse.

It is worth noting that, even though the depression in bipolar disorder mimics that of major depression, patients with major depression never experience a manic phase.

Research has established a genetic contribution, although the experts haven't yet pinpointed the exact genes involved (Bradbury, 2001). While only 2.6% of American adults have bipolar attacks, the disorder is highly heritable, making it far more frequent in some families (Kieseppa and others, 2004; NIMH, 2010b). The fact that bipolar disorder usually responds well to medication also suggests biological factors at work.

Inexplicably, the incidence of bipolar disorder has risen in recent years, particularly in children (Holden, 2008). This hints that the condition may have some environmental or *epigenetic* cause. Mysteriously, it is also more common in the U.S. than in other countries (Merikangas and others, 2011). According to some critics, that suggests that bipolar disorder may be overdiagnosed. The *DSM-5* attempts to correct this with a new diagnostic category, *disruptive mood dysregulation disorder*, for children with frequent episodes of irritability and out-of-control behavior.

# 12.6:  Anxiety Disorders

**Objective:**  **Distinguish among the three types of anxiety disorders described below**

Everyone has experienced anxiety in threatening or otherwise stressful situations.

*But would you pick up a snake?*
*Or would you let a tarantula rest on your shoulder?*

For many people the mere thought of snakes or spiders is enough to send chills of fear down their spines. But that doesn't necessarily mean that they have an **anxiety disorder**. Pathological anxiety is far more debilitating than the normal hesitancy associated with slithering, crawling things. Still, anxiety disorders are also relatively common—even more common than major depression (Barlow, 2000). One estimate says that over our lifetime, 30% of us—more women than men—will experience anxiety symptoms that are serious enough to qualify as one of the anxiety disorders recognized in the *DSM* (Hébert, 2006; Holden, 2005).

Here we will review three of the most common anxiety disorders: generalized anxiety disorder, panic disorder, and a cluster of problems known as phobias. In all three, anxiety is the main symptom.

The major differences have to do with the target and the duration of the anxiety:

- Does it seem to come from nowhere—unrelated to the individual's environment?

- Is it provoked by some object or situation, such as the sight of blood or a snake?

- Is the anxiety present most of the time, or only occasionally?

## 12.6.1:  Generalized Anxiety Disorder

Some 6.8 million Americans spend months or years of their lives coping with anxiety (NIMH, 2010b). Francisca, a lawyer in Los Angeles, says she has dizzy spells, headaches, cold sweats, and frequent feelings of "free-floating" anxiety. But she has no clue why she feels this way. It's not a condition that would likely land her in a mental hospital, but it can be debilitating, nevertheless. A clinician would diagnose Francisca as having a **generalized anxiety disorder**.

Francisca and others with this problem are not worried or fearful about specific situations or objects, such as snakes or spiders. Rather, they have a pervasive and persistent sense of anxiety that seems to come from nowhere and lasts for long periods. They simply feel anxious much of the time, without knowing why. Nor do *we* know why the condition affects women more often than men.

## 12.6.2:  Panic Disorder

A second type of anxiety disorder strikes without warning and then, just as suddenly, fades away. While calmly eating lunch, an unexpected wave of panic sweeps over you, seemingly from nowhere. Your heart races, your body shakes, you feel dizzy, your hands become clammy and sweaty, you are afraid that you might be dying. Then, after a few minutes, the fear and the physical symptoms ebb. You return to normal, feeling a little sheepish. You had a *panic attack.*

The distinguishing feature of **panic disorder** are recurring attacks of fear that come "out of the blue," with no connection to present events (Barlow, 2001). (An isolated panic attack is not considered a mental disorder.) As in generalized anxiety disorder, the feeling is one of "free-floating anxiety." The main difference is that the anxiety attack in panic disorder usually lasts for only a few minutes and then subsides (McNally, 1994).

Because of the unexpected nature of these "hit-and-run" panic attacks, anticipatory anxiety often develops as an added complication. The dread of the next attack and of being helpless and suddenly out of control can lead a person to avoid public places yet to fear being left alone. Cognitive–behavioral theorists view panic attacks as conditioned responses to physical sensations that may have initially been learned during a period of stress (Antony and others, 1992).

From a biological perspective, we have strong evidence of genetic influences in panic disorder (Hettema and others, 2001). We also know that the brain pathways involved include the unconscious arousal pathway and,

especially, the amygdala (Hébert, 2006; LeDoux, 1996; Mobbs and others, 2007). This "fear circuit" easily learns fear reactions but is reluctant to give them up (which makes sense, because this quick learning and slow forgetting had survival value for our ancestors who quickly learned to avoid lions at the water hole). It also appears that overstimulation of these emotion circuits can produce lasting physical changes that make the individual even more susceptible to future anxiety attacks (Rosen & Schulkin, 1998).

To complicate matters, many people with panic disorder also have **agoraphobia**, a fearful reaction to crowded public places, open spaces, or other situations from which they fear that they cannot easily escape. (The term *agoraphobia* literally translates from the ancient Greek language as "fear of the marketplace.") Victims of agoraphobia often fear that, if they have a panic attack in one of these locations, help might not be available or the situation will be embarrassing to them. These fears tend to grow and eventually deprive afflicted persons of their freedom, with some becoming essentially prisoners in their own homes, unable to hold a job or carry on normal daily activities.

It's entirely possible that you may know someone who has panic disorder, with or without agoraphobia: These conditions occur in nearly 4% of the population, again much more commonly in women than in men (Kessler and others, 2005). Fortunately, the treatment outlook is hopeful. Medical therapy relies on anti-anxiety drugs to relieve the panic attacks. Psychological therapy is also effective. In fact, cognitive–behavioral therapy may equal or outperform drug therapy in subduing panic attacks.

## 12.6.3: Phobias

In contrast with panic disorder and generalized anxiety disorder, **specific phobias** involve an irrational, debilitating fear of a particular object, activity, or situation—a response all out of proportion to the circumstances. Phobias may focus on blood, spiders, snakes, thunder, lightning, germs, or any of dozens of objects or situations. It is important to understand that phobias are full-blown fears, not mere dislikes, aversions, or "Eeeww" experiences. (You don't have *numerophobia* just because you don't like math—but only if you actually fear the sight of numbers! It's a pretty rare phobia.)

Afflicting more than 10 million Americans each year, phobias cause great disruption in many people's lives (Winerman, 2005b). Certain phobias, such as a fear of heights (*acrophobia*) or closed spaces (*claustrophobia*), occur so commonly that they seem almost the norm. (*Claustrophobia* often prevents people from getting the needed MRI scans because of the confined space within the machine.) Other common phobic disorders include *social anxiety disorder* (irrational fear of normal social situations), fear of dogs (*cynophobia*), and fear of the dark (*nyctophobia*).



Another form of social phobia involves an extreme fear of public speaking.

Other specific phobias, however, can be are quite rare, such as fear of books, string, or even toads! A list of common and not-so-common phobias appears in Table 12.4.

**Table 12.4** Phobias

| *DSM-5* Category | Object/Situation | Incidence |
|---|---|---|
| **Agoraphobia** | Crowds, open spaces | Common (3.5–7% of adults) |
| **Social Anxiety Disorder** | Fear of being observed or doing something humiliating | Common (11–15%) |
| **Specific Phobias** | Varies by category | (Up to 16% of adults have one or more specific phobias) |
| *Animals* | Cats (ailurophobia) | |
| | Dogs (cynophobia) | |
| | Insects (insectophobia) | |
| | Spiders (arachnophobia) | |
| | Birds (avisophobia) | |
| | horses (equinophobia) | |
| | Snakes (ophidiophobia) | |
| | Rodents (rodentophobia) | |

*(Continued)*

**Table 12.4** Phobias (*Continued*)

| *DSM-5* Category | Object/Situation | Incidence |
|---|---|---|
| *Inanimate objects or situations* | Closed spaces (claustrophobia) | |
| | Dirt (mysophobia) | |
| | Thunder (brontophobia) | |
| | Lightning (astraphobia) | |
| | Heights (acrophobia) | |
| | Darkness (nyctophobia) | |
| | Fire (pyrophobia) | |
| | Water (aquaphobia—not to be confused with *hydrophobia*, which is another term for *rabies!*) | |
| *Bodily conditions* | Illness or injury (nosophobia) | (Up to 16% of adults have one or more specific phobias) |
| | Sight of blood (hematophobia) | |
| | Cancer (cancerophobia) | |
| | Venereal disease (venerophobia) | |
| | Death (thanatophobia) | |
| *Other specific phobias* | Numbers (numerophobia) | Rare |
| | The number 13 (triskaidekaphobia) | Rare |
| | Strangers, foreigners (xenophobia) | Rare |
| | String (linonophobia) | Rare |
| | Books (bibliophobia) | Rare |
| | Work (ergophobia) | Rare |

*Note:* Hundreds of phobias have been described and given scientific names; this table provides only a sample. Some of the rare and strange-sounding phobias may have been observed only in a single patient.

**WHAT CAUSES PHOBIAS?** You may remember that, long ago, John Watson and Rosalie Rayner demonstrated that fears can be learned. We also have good evidence that fears and phobias can be *un*learned through therapy based on classical and operant conditioning (Mineka & Zinbarg, 2006).

But learning may not tell the whole story, says Martin Seligman (1971), who argues that humans are biologically predisposed to learn certain kinds of fears more easily than others. This **preparedness hypothesis** suggests that we carry an innate biological tendency, acquired through natural selection, to respond quickly and automatically to stimuli that posed a survival threat to our ancestors (Öhman & Mineka, 2001). This explains why we develop phobias for snakes and lightning much more easily than we develop fears for automobiles and electrical outlets—even though cars and electric shocks pose a much greater danger for us in the modern world.

The underlying brain mechanisms that produce these fears include the **amygdala** and the unconscious emotion pathway mapped by Joseph LeDoux and his colleagues (Schafe and others, 2005; Wilensky and others, 2006). This pathway allows us to respond quickly, especially to fear-provoking stimuli (Watch out! It's a snake!) before a situation can be analyzed consciously.

# 12.7: Obsessive–Compulsive Disorder

**Objective:** Explain the difference between an obsession and a compulsion, and list the main factors causing OCD

In literature's most famous case of **obsessive–compulsive disorder**, Shakespeare's Lady Macbeth cries, "Out, damn'd spot! Out, I say!" as she repeatedly washes her hands, trying to rid herself of guilt for the murder of King Duncan. Although people with obsessive–compulsive disorder (OCD) don't usually hallucinate about blood on their hands, Shakespeare got the rest spot-on:

> The main characteristics of *OCD* are persistent, unwelcome thoughts, ritual behaviors, and anxiety when the rituals cannot be performed satisfactorily.

Obsessive–compulsive disorder affects about 1% of us in any given year, regardless of culture (Steketee & Barlow, 2002). Even though it involves anxiety, the new *DSM-5* places OCD in a separate category, along with other repetitive and uncontrollable behaviors, such as hoarding, skin-picking, and obsession with one's physical defects.

Obsessive–compulsive disorder makes people engage in senseless, ritualistic behaviors, such as repetitive hand washing.

## 12.7.1: Obsessions

The *obsession* component of OCD consists of thoughts, images, or impulses that recur or persist despite a person's efforts to suppress them. If you have ever been plagued by petty worries or persistent thoughts such as, "Did I remember to lock the door?" you have had a mild obsessional experience. A haunting phrase or melody that keeps running through your mind qualifies as a form of obsession, too. Such thoughts are normal if they occur only occasionally and have not caused significant disruptions in your life. But suppose you have a fear of germs that prevents you from socializing with friends. Or suppose that you fear acting on impulse to harm yourself. Or suppose you have intrusive and unwelcome thoughts about sex. Those are pathological obsessions that can disrupt your life. And because people with OCD realize that their obsessive thoughts mark them as odd, they often go to great lengths to hide their compulsive behavior from other people. This, of course, places restrictions on their domestic, social, and work lives. Not surprisingly, people with OCD have extremely high divorce rates.

*Compulsions*, the other half of obsessive–compulsive disorder, are repetitive, ritual acts performed according to certain private "rules" in response to an obsession. People with OCD symptoms feel that their compulsive behavior will, somehow, reduce the tension and anxiety associated with their obsessions. These compulsive urges may include an irresistible need to clean, to count objects or possessions, or to check and recheck "just to make sure" that lights or appliances have been turned off. And, to be classified as a mental disorder, they must occur frequently or otherwise significantly impair daily living. Part of the pain experienced by people with OCD comes from knowing the utter irrationality of their obsessions and compulsions, and their powerlessness to eliminate them.

The tendency for OCD to run in families suggests a genetic link, perhaps to faulty "wiring" of circuits in the brain (Moyer, 2011; Insel, 2010). Some studies have found links to brain injury or infection (Murphy and others, 2010). Another hint comes from the observation that many people with OCD also display *tics*, unwanted involuntary movements, such as exaggerated eye blinks. In these patients, brain imaging often shows oddities in the deep motor control areas (Resnick, 1992). OCD expert Judith Rapoport tells us to think of compulsions as the brain's "fixed software packages," programmed for worry and repeated rituals. Once activated, she

theorizes, the patient gets caught in a behavioral "loop" that cannot be switched off (Rapoport, 1989).

Again (at the risk of sounding obsessive!), we note that biology cannot explain OCD completely, because it can be treated by cognitive–behavioral therapy (Barlow, 2000). A good strategy for treating compulsive Lady Macbeth's ritual hand washing, for example, would call for a form of *extinction*, in which the therapist would prevent her from washing for progressively longer periods. Indeed, such therapy can produce brain changes that show up in PET scans of OCD patients (Schwartz and others, 1996). The general principle is this:

> When we change behavior, we inevitably change the brain, demonstrating once again that biology and behavior are inseparable.

# 12.8: Somatic Symptom Disorders

**Objective:** Distinguish between illness anxiety disorder and conversion disorder

"Soma" means *body.* Thus, the general term **somatic symptom and related disorders** refers to a group of psychological problems manifested as bodily symptoms, and physical complaints, such as weakness, pain, or excessive worry about disease—as in the person who constantly frets about cancer. Not especially common, these disorders occur in about 2% of the population. Still, they have captured the popular imagination under their more common names: "hysteria"[1] and "hypochondria" (Holmes, 2001).

The *DSM-5* recognizes several types of somatic symptom disorders, but we will cover only three: illness anxiety disorder, somatic symptom disorder, and conversion disorder. And, while we're talking about somatic symptom disorders, please note their potential for confusion with the so-called *psychosomatic disorders*, in which mental conditions—especially stress—lead to actual physical disease. The *DSM-5* acknowledges this potential confusion under the headings of "Trauma- and Stressor-Related Disorders" and "Psychological Factors Affecting Medical Condition."

## 12.8.1: Illness Anxiety Disorder and Somatic Symptom Disorder

Because of their exaggerated concern about an illness, such as cancer or AIDS, patients with **illness anxiety disorder**

---

[1]The original term *hysteria* had nothing to do with "going into hysterics." Rather, *hysteria* comes from the Greek word for "uterus" or "womb." Naturally, physicians of old thought that only women could have hysteria, because they believed the physical symptoms to be caused by the uterus migrating to the afflicted part of the body. This, however, is no longer a concern, especially since it was noticed that men can have "hysteria," too.

often bounce from physician to physician until they find one who will listen to their complaints and, perhaps, prescribe some sort of treatment—often minor tranquilizers or placebos. These "hypochondriacs" worry about getting sick. Every ache and pain signals a disease. Naturally, these individuals represent easy marks for health fads and scams.

Illness anxiety disorder is diagnosed when the patient is worried about an illness, but has no physical symptoms. If physical symptoms, such as pain, fatigue, or difficulty breathing, *are* present (but no real physical disease can be identified), then the diagnosis is *somatic symptom disorder*— the namesake for the entire category. Both conditions were formerly lumped together under the heading of *hypochondriasis* in previous editions of the *DSM*.

Critics have noted that some doctors are too eager to diagnose somatic symptom disorder, especially in a woman—jumping to the conclusion that her concerns are imaginary. This, of course, can have disastrous consequences, as when a mistaken impression of this disorder blinds the physician to a very real and serious physical disease.

## 12.8.2: Conversion Disorder

Physical complaints involving sensory loss, muscle weakness, or paralysis—but clearly without a physical basis— suggest a **conversion disorder**, also called *functional neurological symptom disorder* in the *DSM-5.* People with this diagnosis may, for example, be blind, deaf, unable to walk, or insensitive to touch in part of their bodies. ("Glove anesthesia," shown in Figure 12.8, is a rare but classic form of sensory loss in conversion disorder.)

**Figure 12.8** Glove Anesthesia

The form of conversion disorder known as "glove anesthesia."



A          B

Significantly, conversion disorder requires that no signs of organic disease be revealed by a neurological examination, laboratory tests, X-rays, or body scans. In conversion disorder, the problem really does seem to be "all in the mind."

Although it is quite rare, we include conversion disorder here because of its historical significance and because patients with this disorder have often been accused of *malingering* (faking an illness). Historically, "hysteria" was more common (or more often diagnosed) in 19th-century Europe. It was also the disorder that captured Freud's interest and steered him into psychiatry. (Freud originally thought that he could cure "hysterical" patients by using hypnosis, but later gave that up in favor of the more lengthy and intense treatment he called **psychoanalysis**.)

We don't know exactly why conversion disorder was more common a century ago in Europe and the United States. Perhaps it has declined in industrialized countries due to increased public understanding of physical and mental disorders (American Psychiatric Association, 1994; Nietzel and others, 1998). That explanation fits with the finding that conversion disorder is still relatively common in economically undeveloped regions, such as parts of China (Spitzer and others, 1989) and Africa (Binitie, 1975) and among poorly educated people in the United States (Barlow & Durand, 2005).

What is the difference between conversion disorder and the more common somatic symptom disorder? In both cases, the clinician suspects a *psychogenic* (mental) cause, but in conversion disorder the symptoms *must* include sensory loss, muscle weakness, or paralysis. The distinction is admittedly subtle, and, if your authors may be permitted an editorial opinion, we think it points to a lack of solid research concerning all the somatic symptom disorders.

The term *conversion disorder* itself also carries with it some baggage from the Freudian past. Originally, the term implied an unconscious displacement (or *conversion*) of anxiety into physical symptoms—although most clinicians no longer subscribe to that explanation. The diagnosis also has a reputation for being used as a "dumping ground" for those—especially females—who present physical symptoms but no obvious medical abnormality (Kinetz, 2006).

Some cases of conversion disorder are now thought to stem from physical stress responses. Another possibility, suggested by David Oakley (1999) of the University College in London, is that a common brain mechanism underlies conversion disorder and hypnosis. Accordingly, he suggests that conversion disorder and related mental problems be reclassified as *auto-suggestive disorders.*

## 12.9:  Dissociative Disorders

**Objective:**  **Identify the common factor that distinguishes the dissociative disorders**

We may speak metaphorically of being "beside ourselves," but in the dissociative disorders, the feeling is no metaphor.

The common denominator for all the **dissociative disorders** is "fragmentation" of the personality—a sense that some parts of the personality have become detached (dissociated) from one's sense of self. Among the dissociative disorders, we find some of the most fascinating forms of mental pathology, including *dissociative amnesia*, *dissociative fugue*, *depersonalization/derealization disorder*, and the controversial *dissociative identity disorder* (formerly called "multiple personality"), made famous by the fictional Dr. Jekyll and Mr. Hyde.

Let's begin with dissociative amnesia.

## 12.9.1: Dissociative Amnesia

You may know an *amnesia* victim who has suffered a memory loss as the result of a severe blow to the head, perhaps in an auto accident. In such cases, we typically find loss of recent memories, while well-established long-term memories are preserved. But dissociative amnesia is different—and much more rare.

In **dissociative amnesia**, the memory loss is usually selective for specific personal events; that is, for portions of **episodic memory**, but not necessarily for recent memories. The cause might be a stroke, alcoholic blackouts, or a blood sugar crisis. But the origin is not always physical. A purely psychological form of dissociative amnesia can result from a psychologically traumatic or a highly stressful experience.

As you might have guessed, dissociative amnesia has a close kinship with **posttraumatic stress disorder**. In both conditions, memory loss may be for a particularly stressful incident or period in the person's life, although in stress disorders the memories are more likely to be strong and intrusive, rather than lost. We should note, however, that dissociative amnesia can be a controversial diagnosis, particularly when associated with "recovered memories" of childhood abuse. Research on memory suggests that such memories, when they seem to be "recovered," are most likely fabrications—sometimes the result of suggestion by overzealous therapists. As the *DSM-5* states, dissociative amnesia may have "been overdiagnosed in individuals who are highly suggestible" (p. 479).

One special form of dissociative amnesia is the stuff of novels and legends—and also of true newspaper and TV accounts. Consider the story of a woman the media called "Jane Doe," who was found near death in a Florida park, incoherent and suffering the effects of exposure. Unlike most victims of dissociative amnesia, Jane Doe had a pervasive memory loss: no memory of her identity, previous events in her life, or any ability to read or write. Doctors diagnosed her with **dissociative fugue**, which the *DSM-5* now regards as a specific type of dissociative amnesia. Therapy revealed only general information about the kind of past she must have had, but no good clues as to her identity. After a nationwide television appeal, her doctors

were flooded with calls. The most promising lead came from an Illinois couple, certain she was a daughter they had not heard from for more than 4 years. But despite their confidence that she was their daughter—even after meeting with her—Jane Doe was never able to remember her past (Carson and others, 2000).

Jane Doe's case was an extreme one: In most cases the fugue state lasts only hours or days, followed by complete and rapid recovery. Less often it may continue for months—or, as with Jane Doe, for years.

By definition, *dissociative fugue* is a subtype of dissociative amnesia, involving a combination of *amnesia* and *fugue* or "flight." In such persons, amnesia takes the form of a lost sense of identity, while the fugue component may cause them to flee their homes, families, and jobs. Some victims appear disoriented and perplexed. Others may travel to distant locations and take up new lives, appearing unconcerned about the unremembered past.

Heavy alcohol use may predispose a person to dissociative fugue. This suggests that the condition may involve some brain impairment—although no certain cause has been established. Like dissociative amnesia, fugue occurs more often in those under prolonged high stress, especially in times of war and other calamities.

## 12.9.2: Depersonalization/Derealization Disorder

Yet another form of dissociation involves a sensation that mind and body have separated. People with **depersonalization/derealization disorder** commonly report "out-of-body experiences" or feelings of being external observers of their own bodies. Some feel as if they are in a dream. (Fleeting, mild forms of this are common, so there is no cause for alarm!) A study of 30 such cases found that obsessive–compulsive disorder and certain personality disorders often accompany this condition (Simeon and others, 1997). The causes are unknown.

People who have experienced severe physical trauma, such as a life-threatening injury in an auto accident, may also report symptoms of depersonalization. So do some individuals who have had near-death experiences. The effect is also common among those using recreational drugs. Usually the sensation passes rather quickly, although it can recur. In such individuals, investigators have attributed the disorder to hallucinations and to natural changes in the brain that occur during shock (Siegel, 1980). One study has found people with this disorder to have abnormalities in the visual, auditory, and **somatosensory cortex** (Simeon and others, 2000).

## 12.9.3: Dissociative Identity Disorder

Robert Louis Stevenson's famous fictional story of Dr. Jekyll and Mr. Hyde has become a misleading stereotype

of "multiple personality"—now called **dissociative identity disorder**. In reality, most such cases occur in women, and most display more than two identities (Ross and others, 1989). Unlike the homicidal Mr. Hyde in Stevenson's yarn, seldom do people with dissociative identity disorder pose a danger to others.

Although it was once thought to be rare, some specialists believe that this controversial condition has always been common but hidden or misdiagnosed. Others believe that it is primarily the result of suggestion by the therapist—and not a real disorder at all (Piper & Mersky, 2004a, 2004b). Proponents of the diagnosis say that dissociative identity disorder usually appears in childhood among victims of sexual abuse (Putnam and others, 1986; Ross and others, 1990; Vincent & Pickering, 1988). The formation of multiple identities or selves (sometimes referred to as *alters*) is believed, by some clinicians, to be a defense by the dominant personality to protect itself from terrifying events or memories. This view, however, is controversial.

Dissociative identity disorder (DID) has become a familiar diagnosis because of its portrayal in popular books such as *Sybil* (Schreiber, 1973) and *The Flock* (Casey & Wilson, 1991) and in films such as the 1996 production *Primal Fear* and *The Secret Window* (2004), starring Johnny Depp. Each emerging personality seems to contrast in some distinctive way with the original self. For example, the new alter might be outgoing if the original personality is shy, tough if the original is weak, and sexually assertive if the other is fearful and sexually naive. These alternate identities, each apparently with its own consciousness, emerge suddenly—usually under stress.

What lies behind this mysterious disturbance? Psychodynamic theories explain it as a fracturing of the ego as a result of ego defense mechanisms that do not allow energy from conflicts and traumas to escape from the unconscious mind. Cognitive theories see it as a form of role playing or, perhaps, *mood-state dependency*, a form of memory bias in which events experienced in a given mood are more easily recalled when the individual is again in that mood state (Eich and others, 1997). Others suggest that at least some cases are frauds—as in the case of a student charged with plagiarizing a term paper, who claimed that he had multiple personalities and that one of them copied the paper without the knowledge of his dominant personalities.

To clear up a common point of confusion: In earlier editions of the *DSM*, dissociative identity disorder was called **multiple personality**—a term still heard occasionally. Adding to the confusion, DID is sometimes mistakenly called "split personality," an obsolete term for schizophrenia—which has *no* relationship to dissociative identity disorder at all. In schizophrenia (which literally means "split mind"), the "split" refers to a psychotic split or disengagement from reality, *not* to a fracturing of one personality into many—which leads us to a discussion of schizophrenia … next.

# 12.10: Schizophrenia

**Objective:** Describe the factors that distinguish schizophrenia and related disorders. Also indicate the possible causes that are being explored

The schizophrenic world may turn bleak and devoid of meaning, or it may become so filled with sensation that everything appears in a confusion of multiple realities layered with hallucinations and delusions. In **schizophrenia**, emotions may be blunted or exaggerated, thoughts may turn bizarre, language may take strange twists, and memory may become fragmented (Danion and others, 1999). The disorder breaks the unity of the mind, often sending its victims on meaningless mental detours. They may spout sequences of "clang" associations (associations involving similar-sounding words) and produce confused verbalizations that clinicians call "word salads." Here is an example of this type of schizophrenic speech:

> The lion will have to change from dogs into cats until I can meet my father and mother and we dispart some rats. I live on the front of Whitton's head. You have to work hard if you don't get into bed. . . . It's all over for a squab true tray and there ain't no squabs, there ain't no men, there ain't no music, there ain't no nothing besides my mother and my father who stand alone upon the Island of Capri where is no ice. Well it's my suitcase sir. (Rogers, 1982)

Schizophrenia is the disorder that most likely comes to mind when we hear the terms "madness," "psychosis," or "insanity." In psychological terms, it encompasses several related forms of psychopathology in which personality seems to disintegrate, emotional life becomes disrupted, cognitive processes grow distorted, and the mind disengages from reality. It was also the diagnosis given to all but one of Rosenhan's pseudopatients.

Hearing voices is another common symptom. Remarkably, though, what the voices have to say depends on the culture. In the U.S., schizophrenic patients usually report that their voices are threatening or insulting. They may also command patients to hurt themselves. But research in India and Ghana shows patients more often describing hallucinated voices as familiar and positive—sometimes identifying them as family members, or even God (Luhrmann and others, 2015).

In a lifetime, more than 1 of every 100 Americans—more than 2 million over the age of 18—will become afflicted with schizophrenia. Most will struggle with recurrent episodes all through their lives (Jobe & Harrow, 2010). For as yet unknown reasons, the disorder occurs in men more often than in women, with its first appearance in men usually before they are 25 and in women between 25 and 45 (Holden, 2005; NIMH, 2010b).

---

**Figure 12.9** Diagnosing Schizophrenia

One indicator must be active or "positive," e.g., delusions, hallucinations, or disorganized speech. The signs and symptoms must also be of significant duration and an impairment to daily living. Finally, the condition must not be caused by drugs or another medical condition.

**Schizophrenia** is diagnosed when two or more of the following is present for a significant portion of time during a 1-month period

**Delusions (sometimes referred to as *paranoid delusions*)**

**Hallucinations**

**Disorganized speech and thinking**

**Grossly abnormal movements or postural rigidity**

**"Negative" symptoms (defined by the absence of healthy characteristics) include impoverished emotional responsiveness, poor hygiene, lack of interest in social interaction**

## 12.10.1: Diagnosing Schizophrenia

In Figure 12.9, you can see the requirements for a diagnosis of schizophrenia according to the *DSM-5.*

For patients who do not meet the criteria for schizophrenia, the clinician may select an alternative diagnosis, such as one of the following:

- *Delusional Disorder:* appropriate when delusions are the main symptom, and there are no other signs of psychosis
- *Schizoaffective Disorder:* characterized by severe emotional (affective) disturbances, along with other signs of psychosis.

**WATCH** Schizophrenia



Georgiana suffers from schizophrenia and has delusions which are disturbances of thought.

The patient tells how her schizophrenic symptoms allowed her to "escape."

Similarly, if the diagnosis is not schizophrenia, yet the problem runs through all aspects of the person's life and is of long standing, the clinician may decide to label the condition as one of the **personality disorders** marked by certain schizophrenia-like symptoms:

- *Schizotypal Personality Disorder:* indicated by a long-standing pattern of social and interpersonal problems, along with a pattern of odd behaviors and beliefs that don't qualify as frankly psychotic.
- *Schizoid Personality Disorder:* marked more by the "negative" symptoms of poor social relationships and poverty of emotional expression.
- *Paranoid Personality Disorder:* featuring suspiciousness and distrust of others; tendency to read hidden and threatening meanings into remarks or events.
- *Borderline Personality Disorder:* indicated by a long-standing pattern of impulsivity and unstable, yet intense, interpersonal relationships. Patients may also be suicidal (also making this condition difficult to distinguish from depression and bipolar disorder). Self-destructive behavior may also take the form of mutilation, substance abuse, or reckless driving.

## 12.10.2: Possible Causes of Schizophrenia

Our understanding of schizophrenia has changed radically in recent years. No longer do most clinicians look through the Freudian lens to see schizophrenia as the result of bad parenting or repressed childhood trauma (Walker & Tessner, 2008). Studies show that adopted children with no family history of schizophrenia run no increased risk of

**Figure 12.10** MRI Scans of Twin Pairs in Which One Twin Has Schizophrenia and One Does Not

In each pair of images, the twin with schizophrenia is on the right. Note the enlarged ventricles (fluid-filled spaces) in the brain.



developing schizophrenia when placed in a home with a parent who has the disorder (Gottesman, 1991). Current thinking among psychiatrists and psychologists is that schizophrenia is fundamentally a brain disorder—or a group of disorders—that is highly heritable (Grace, 2010; Karlsgodt and others, 2010; Walker and others, 2010).

**BIOLOGICAL FACTORS IN SCHIZOPHRENIA**   Support for this brain-disorder view comes from many quarters. For one thing, the antipsychotic drugs (sometimes called *major tranquilizers*)—which interfere with the brain's dopamine receptors—can suppress the positive symptoms of schizophrenia, such as hallucinations or delusions (Mueser & McGurk, 2004). Conversely, drugs that stimulate dopamine production (e.g., the amphetamines) can actually *produce* schizophrenic reactions. Recently, attention has turned to deficiencies in the neurotransmitter glutamate found in schizophrenic patients (Berenson, 2008; Javitt & Coyle, 2004). Other evidence of a biological basis for schizophrenia comes in the form of abnormalities shown on brain scans, such as you see in Figure 12.10 (Conklin & Iacono, 2004; NIMH, 2005). In that vein, an especially provocative finding from MRI studies suggests that schizophrenia occurs when the brain fails to synchronize its neural firing across the cortex (Bower, 2005b; Symond and others, 2005).

Yet another line of evidence for the biological basis of schizophrenia comes from family studies (Conklin & Iacono, 2004; Holden, 2003). While no specific gene has shown to cause schizophrenia, we do know that the closer one's rela-

tionship to a person with the disorder, the greater one's chances of developing schizophrenic symptoms (Gottesman, 2001; Pogue-Geile & Yokley, 2010; Walker & Tessner, 2008).

**SCHIZOPHRENIA IS NOT ALL DIATHESIS**   Yet again, we sing the same refrain: Biology does not tell the whole story. Roughly 90% of the relatives of people with schizophrenia do *not* develop the disorder (Barnes, 1987). Even in identical twins who share exactly the same genes, the *concordance rate* (the rate at which the disorder is shared by both) for schizophrenia is only about 50%; that is, in half the cases in which schizophrenia strikes identical twins, it leaves one twin untouched (see Figure 12.11). Increasingly, this lack of 100% concordance in identical twins suggests that stress and epigenetic factors are at work.

This broader perspective is often called the **diathesis–stress hypothesis**. According to this view, biological factors put certain individuals at risk for mental disorder, but stressors in their lives transform the potential for psychopathology into an actual disorder (Walker & Tessner, 2008). The term *diathesis* refers to a predisposition or physical condition that makes one susceptible to disease, while *stress* can come from both psychological and biological stressors, including drugs and epigenetic factors.

So, can environment counterbalance diathesis—a predisposition for schizophrenia? Yes—to some extent—suggests a Finnish study. Being raised in a healthy family environment can actually *lower* the risk of schizophrenia in adopted children who have a hereditary predisposition to the disease

**Figure 12.11**  Genetic Risk of Developing Schizophrenia



Figure caption content (bar chart):

- General population — 1%
- Spouses of patients — 2%
- First cousins (third degree) — 2%
- Uncles/aunts — 2% (Second-degree relatives)
- Nephews/nieces — 4% (Second-degree relatives)
- Grandchildren — 5% (Second-degree relatives)
- Half siblings — 6% (Second-degree relatives)
- Siblings — 9% (First-degree relatives)
- Child of 1 parent with schizophrenia — 13% (First-degree relatives)
- Siblings with 1 parent with schizophrenia — 17% (First-degree relatives)
- Fraternal twins — 17% (First-degree relatives)
- Child of 2 parents with schizophrenia — 46%
- Identical twins — 48%

Lifetime risk of developing schizophrenia (x-axis: 0 to 50)

(Tienari and others, 1987). Again, this study supports the idea that schizophrenia requires both a biological predisposition plus some unknown environmental or epigenetic agent to "turn on" the hereditary tendency (Cromwell, 1993; Iacono & Grove, 1993). This agent could be a chemical toxin, stress, or some factor we have not yet dreamed of.

---

**WRITING PROMPT**

**Schizophrenia**

Look back at the symptoms of schizophrenia presented by Rosenhan's pseudopatients. Would they qualify for a diagnosis of schizophrenia under the new DSM-5 standards? Explain why or why not.

▶ ┌─────────────────────────────────────────┐
  │ **The response entered here will appear in the** │
  │ **performance dashboard and can be viewed by** │
  │ **your instructor.** │
  └─────────────────────────────────────────┘

  [ Submit ]

# 12.11:  Neurodevelopmental Disorders

**Objective:**  **List the neurodevelopmental disorders discussed below, along with their distinguishing characteristics**

Developmental problems can appear at any age, but several common ones first occur in childhood, including autism spectrum disorder, attention-deficit hyperactivity disorder (ADHD), and dyslexia. The new *DSM-5* calls these **neurodevelopmental disorders**, despite the fact that the underlying causes remain unclear.

We begin with autism.

## 12.11.1:  Autism Spectrum Disorder

An impoverished ability to "read" other people is a hallmark of **autism spectrum disorder**. Persons with autism say that they have trouble understanding other people's emotions, facial expressions, and intentions. To illustrate difficulties in understanding intentions let's look in on a classic laboratory test that might be given to a child suspected of having an autism spectrum disorder. The following is presented to the child in a puppet show:

Sally and Anne are playing together, when Sally puts a piece of candy in a box and then leaves the room. While Sally is gone, Anne opens the box, removes the candy, and stashes it in her purse. When Sally comes back, where will she look for the candy?

Children *without* autism spectrum disorder will say that Sally (who didn't see Anne switch the candy to her purse) will look in the box; that is, they realize that different people may hold different beliefs, based on different observations. But children *with autism* have a poorly developed **theory of mind** that prevents them from understanding what Sally

must have been thinking (Frith, 1993); that is, they have difficulty imagining themselves in another person's frame of mind. As a result, they often have difficulty with empathy and social relationships because they cannot see any perspective but their own—which relegates them to a life of social difficulties.

Besides the theory-of-mind deficiencies and social problems, many persons with autism spectrum disorder also have language difficulties. Commonly, the parents or the physician first suspect the disorder at about 1½ to 2 years of age, when the child is slow to speak (Kabot and others, 2003). Some never achieve functional language at all.

In severe cases, autism spectrum disorder may also produce unusual behaviors, some of which can be harmful. These often consist of some form of self-stimulation, such as head-banging. Repetitive behaviors, such as rocking, are also common.

Because of these multiple problems, autism may sometimes be mislabeled as intellectually disabled. (Note, however, that most persons with intellectual disabilities are *not* autistic.) Conversely, some individuals on the autism spectrum can function at a very high level, in fields that capture their interests and do not require social adeptness. (Such high-functioning individuals were formerly classified as having *Asperger's syndrome*, in previous editions of the DSM.)

Most experts now believe that autism is fundamentally a brain disorder of undetermined cause. Some evidence suggests a link between autism and toxic materials in the environment or epigenetic factors that regulate gene expression improperly in the brain (Mbadiwe & Millis, 2013; Neimark, 2007; Schanen, 2006). Incidentally, there is much hype—but *no* evidence—that vaccines cause autism (Centers for Disease Control and Prevention, 2015).

Other work suggests that persons with autism may have fewer **mirror neurons** in their brains (Miller, 2005; Ramachandran & Oberman, 2006). This finding has grabbed clinicians' interest because some of our mirror neurons purportedly do exactly what persons with autism have difficulty doing: sensing other people's intentions (Dobbs, 2006a; Rizzolatti and others, 2006).

The National Institute of Health estimates that some form of autism occurs in about 1 in 500 children. Although you may have seen news reports of a rising incidence of autism in recent decades, experts attribute this primarily to an expanded definition of the disorder that came into wide use in the 1990s, resulting in more individuals qualifying for the diagnosis (Gernsbacher and others, 2005); that is, there appears to be no "autism epidemic."

At present, autism has no cure, although behavioral treatment programs, engaging both parents and children, can improve socialization and speech and diminish self-destructive behavior. Unfortunately, such programs are time consuming and relatively expensive.

## 12.11.2: Dyslexia and Other Specific Learning Disorders

Reading is a key that opens many doors in a modern, information-driven society. But those doors can remain closed for people who have difficulty in reading: people with **dyslexia**. The disorder affects about 1 of 5 children to some degree, often leading to poor school performance, diminished self-esteem, and eventually to lost career opportunities (Shaywitz, 1996). To be clear, dyslexia is not a formal diagnostic category in the *DSM-5*. Rather, a person with this condition is diagnosed as having a *specific learning disorder* centering on reading impairment.

Research over the past two decades suggests that severe dyslexia involves abnormalities in the brain's language-processing circuits (Breier and others, 2003). Ironically, another "cause" may be language itself: People whose primary language is English—with its bizarre ways of spelling, including some 1,120 ways to spell only 40 different sounds—are much more likely to develop dyslexia than are Italian speakers, who must contend with only 33 combinations of letters for 25 sounds (Helmuth, 2001b; Paulesu and others, 2001).

According to some experts, we should not think of dyslexia as a distinct disorder at all. Dr. Sally Shaywitz and her colleagues (1990) have made the case that no diagnostic marker sets individuals with dyslexia clearly apart from others who are merely poor readers. Rather, she argues, dyslexia is simply the diagnosis we give to an arbitrarily defined group of people occupying the lower end of the reading-abilities spectrum.

While not everyone agrees with Shaywitz, they do agree that recent years have seen great strides in developing treatments and debunking some of the myths surrounding dyslexia. (Incidentally, IQ has nothing to do with it: Smart people *can* have dyslexia. Einstein apparently did!) Currently, the most effective therapies include special reading programs that emphasize the matching of sounds to letter combinations.

According to the Yale Center for Dyslexia and Creativity (2015), many famous and successful people struggled with the disorder, including Whoopi Goldberg and Jay Leno—even Albert Einstein. Not surprisingly, then, dyslexia has receive much attention in the media. But there are other specific learning disorders recognized by the DSM-5. Others include impairments in writing or mathematics. The important thing to note here is that this group of disorders is not the result of generally low intellectual ability, but rather is confined to a specific academic skill. While DSM-5 usually does not speculate on causes of mental disorders, it does baldly characterize this group as disorders as of the brain.

### 12.11.3: Attention-Deficit Hyperactivity Disorder (ADHD)

Most children have trouble sitting still for long periods, while focusing attention on a task, such as solving a math problem or listening to directions from the teacher. But some have more trouble than others. Many things can contribute to attention deficit and hyperactivity, including boring assignments, distracting problems at home, abuse from peers, or merely a cultural tradition that places low value on the tasks that demand quiet attention. Those issues aside, some children apparently have a brain-based condition, known as **attention-deficit hyperactivity disorder (ADHD)**, that can interfere with even the best of intentions to focus attention and sit quietly (Barkley, 1998; Nigg, 2010). Our best estimate is that ADHD affects some 3% to 5% of school-age children (Brown, 2003b; NIMH, 2010b).

ADHD is a controversial diagnosis, and its treatment is even more controversial (Sax & Kautz, 2003). Critics claim that ADHD is overdiagnosed, often being used to describe normal rambunctiousness or to blame children for the mistakes made by unskilled parents and teachers. Moreover, the treatment of choice—stimulant drugs— strikes many people as being wrongheaded. Yet many careful studies have demonstrated that properly administered drug therapy, along with behavioral therapy, can improve attention and diminish hyperactivity in a majority (perhaps 70%) of individuals diagnosed with ADHD (Daley, 2004; MTA Cooperative Treatment Group, 2004).

# 12.12: Beyond the *DSM-5:* What's Next?

**Objective:** Describe the alternatives to the DSM-5 that are currently being developed

While the *DSM-5* has its critics, the need for a common language of psychological disorder has brought it wide acceptance. Nevertheless, many clinicians have strong reservations about the *DSM-5* classification system and would like to replace it with something better. As we have said, one thing most critics don't like about the *DSM-5* is that it organizes disorders by *symptoms*, not by underlying *causes*. The reason it does so, of course, is that the underlying causes of mental disorders are not well understood. As a consequence, there are no objective diagnostic tests for any of the primary disorders— so every *DSM-5* diagnosis relies on a checklist of symptoms and on subjective clinical judgment.

As we have said, many psychologists are also uncomfortable with the idea of mental disorders as medical "diseases," which is assumed by the *DSM-5*. Rather, they conceive of many mental disorders as maladaptive behavior patterns that have been *learned*. Some mental "illnesses,"

they note, might even be a normal response to an abnormal environment.

So is there any alternative to the *DSM-5* on the horizon?

### 12.12.1: An Alternative View from NIMH

Tom Insel and Bruce Cuthbert, research directors at the National Institute of Mental Health (NIMH), point out that we already know a great deal about the biology of mental disorders (Cuthbert & Insel, 2013; Insel, 2013; Voosen, 2013). For example, researchers at NIMH have noticed that, while certain conditions (such as schizophrenia and depression) are strongly heritable, studies show that many seemingly *different* disorders involve abnormalities of the *same genes*—suggesting that they may have a common basis in brain biology. Moreover, they have found that relatives of patients with certain disorders have higher rates of *other* mental disorders, as well. So, while families of schizophrenic patients have an unusually high incidence of schizophrenia, they also have a higher than expected incidence of bipolar disorder. All this suggests that grouping mental disorders by their symptoms ignores what is actually happening in the brain.

**WITH WHAT DOES THE NIMH HOPE TO REPLACE THE DSM-5?** Cuthbert and Insel (2013) have proposed a new perspective of mental function and dysfunction, based on five core brain "systems" or *domains*:

- **Maintenance**—The most basic domain involves deep-brain circuits that keep the brain operating (e.g., alert or asleep).
- **Rewards**—This system involves the brain machinery that motivates us to seek rewards (e.g., food, shelter), along with the positive or "approach" emotions associated situations or goals that we find attractive.
- **Memory and other executive functions**—A third domain involves the processes required for focusing attention and for storing, retrieving, and using information.
- **Social processes**—A fourth domain centers on understanding and interacting with other people.
- **Punishments, and threats**—The fifth system focuses on fear and avoidance: on situations and emotions we associate with harm. For certain mental disorders, such as phobias, this fear-avoidance system is an especially important one.

These five core systems, then, involve not only specific brain structures but their associated neurotransmitters and pathways, along with parts of the **endocrine system**.

So, this new perspective conceives of mental disorders as involving distinctive patterns of abnormality in these five brain domains. For example, what we now think of as major depression might involve dysfunction of the reward and the threat systems and, perhaps, the memory system. Fears and phobias

might be confined to the punishment and threat system. And psychotic disorders may involve all five. Again, research attempting to identify these patterns is in the early stages.

## 12.12.2: Of Brain "Hubs" and Mental Disorders

A collaborative team of British and U.S. neuroscientists has recently found that a small number of neural "hubs" are responsible for routing most of the messages around the brain. Moreover, these hubs look a lot like Insel and Cuthbert's five brain domains or "systems." But here's the most important part: The team also found that malfunctions occur primarily at those brain hubs in a huge sample of nearly 10,000 patients diagnosed with 26 mental disorders, including depression, schizophrenia, autism, and Alzheimer's disease. Moreover, different disorders seemed to involve different patterns of abnormality in those hubs (Crossley and others, 2014; Sanders, 2014).

This work, for the first time, offers some real hope of an objective test for diagnosing at least some mental disorders. One day soon, perhaps, schizophrenia or depression or bipolar disorder can be diagnosed with certainty from characteristic patterns seen on brain scans. Unfortunately, for the moment, we must still rely on the *DSM-5* and subjective clinical judgments.

## 12.12.3: In the Opinion of Your Authors

Think of a sound board, like a sound technician might use to mix sounds of various voices and instruments at a recording session or a concert. You have probably seen them: panels with "sliders" that can be adjusted to change the loudness of various sound sources. Now, think of the brain as having much the same mechanism—as having different settings for controlling the flow of information thorough its main "hubs" or "domains." A certain range of these brain settings produces the "normal" variation we see among people. But when the "sliders" are set (by heredity or experience) above or below the normal range, we get the gamut of mental disorder.

While it may appear that your authors have abandoned psychology for biology—we have not. Rather, we are acknowledging that all behavior is ultimately influenced by the brain. And neuroscientists are fast coming to



an understanding of these underlying brain processes. Ultimately, we see the field moving away from the *DSM-5's* symptom-based classification system and more toward something like the NIMH view or the "hub" model—but with some psychological modifications. We predict that, as research reveals more and more about the biology of mental disorders, the next widely accepted classification system will have the following features:

- Different mental disorders will be seen as different patterns of activity (or "settings") in the brain's core information processing systems or "hubs."
- Both nature and nurture (heredity and environment) will be seen as responsible for the "settings" in the core brain hubs.
- Learning will be widely recognized as producing physical changes in the brain—and, therefore, as having a central role in both causing and treating mental disorders.
- Epigenetics, along with learning—whereby experience can modify genetic expression—will be seen as increasingly important in adjusting the "settings" in the brain.

Don't expect these changes to come overnight. Rather, it will take a lot of research and a major change in perspective within the mental health establishment. Maybe we will see some steps in this direction within another decade or two—and perhaps in the *DSM-6.*

---

**Psychology Matters**

## Shyness

It makes you a little uncomfortable to be around people, especially those you don't know well. You're not good at the "small talk" people use when they are getting to know each other—or maybe you just don't have the patience for it … or don't want to say the wrong thing and offend someone. Besides, you always seem to feel that people are making negative judgments about you. It's really just easier and more comfortable to be by yourself. You are *shy.*

Being shy is a common problem, but it is not a *DSM-5* disorder in itself. Rather, **shyness** refers to a distressing pattern of avoiding or withdrawing from social contact. At the extreme, shy behavior can warrant a diagnosis of social phobia or an avoidant personality disorder, when afflicted individuals go to extremes, seeking to isolate themselves from social interactions. As we have seen many times before, it is all a matter of degree. For most shy people, however, the tragedy is that they suffer from loneliness and from lost opportunities to pursue interests and relationships.

### What Is the Origin of This Often Painful Problem?

Shyness is one of three basic temperaments found in infants that, for many, will continue through life (Kagan and others,

1988, 1994). Kagan (2001) has proposed that this pattern may have its basis in a person's biological makeup. Nevertheless, shyness and other forms of social anxiety can also be *learned* responses. Even those who are not "born shy" can acquire shy behavior patterns.

On a hopeful note, shyness does not have to be a permanent condition. Many people overcome it on their own. Organizations such as Toastmasters help people build verbal skills and confidence in social situations. Many others have found the help they need in cognitive–behavioral therapy groups. For more information, you may want to read *Shyness: What It Is*, *What to Do About It* by Philip Zimbardo (1990). Please forgive the shameless plug of a book by your senior author.

# Key Question: What Are the Consequences of Labeling People?

> **Core Concept 12.3**
>
> **Ideally, accurate diagnoses lead to proper treatments, but diagnoses may also become labels that depersonalize individuals and ignore the social and cultural contexts in which their problems arise.**

*"Mad." "Maniac." "Mentally ill." "Crazy." "Insane." "Disturbed." "Neurotic."*

These terms, along with all the official diagnostic terms that appear in the *DSM-5*, are *labels* used by the public, the courts, and mental health professionals to describe those who have mental disturbances. Ideally, of course, an accurate diagnostic label leads to good communication among mental health professionals and an effective treatment program for afflicted individuals. Sometimes, however, labels just create confusion—or worse. **Labeling** can make us think of people as stereotypes, masking their personal characteristics and the unique circumstances that contribute to their disorders. And, if that were not enough, labels can provoke prejudices and social rejection.

In this section, we will begin with the problem of labeling as it negatively affects the individual. Then we will pursue the issue of labeling in a larger context by asking: Does "psychological disorder" or "mental illness" carry the same meaning in all cultures? Finally, we will bring the topic home with a critical look at the dangers of applying diagnostic labels to your friends and family. The core concept that organizes all this states:

> Ideally, accurate diagnoses lead to proper treatments, but diagnoses may also become labels that depersonalize individuals and ignore the social and cultural contexts in which their problems arise.

By the end of this section, you will be able to:

**12.13** **Explain how labeling might cause depersonalization**

**12.14** **Explain how culture can affect both the symptoms and prevalence of psychological disorders. Give some examples**

# 12.13: Diagnostic Labels, Labeling, and Depersonalization

**Objective:** **Explain how labeling might cause depersonalization**

Labeling a person as "mentally disturbed" or "mentally ill" can have both serious and long-lasting consequences aside from the condition itself. Compare mental disorders with physical illnesses, such as a broken leg or appendicitis: When a physical illness has healed, the diagnosis moves into the past. Not so with mental disorders. A label of "depression" or "mania" or "schizophrenia" can be a stigma that follows a person forever (Farina and others, 1996; Wright and others, 2000). But what about a mistaken diagnosis? As Rosenhan pointed out, a mistaken diagnosis of cancer is cause for celebration, but almost never is a diagnosis of mental disorder retracted. As you will recall from the "pseudopatient" study, discussed at the beginning of the chapter, the glaring fact of normalcy never emerged: once labeled "schizophrenic," always schizophrenic—but, perhaps, "in remission."

Sadly, in our society, to have severe mental problems is to be stigmatized and devalued. And so, a diagnostic label may lead to a cycle of mistreatment and neglect caused by the second-class status accorded people with mental disorders. Even in a mental hospital, treatment can involve **depersonalization**—a nonentity, a nobody—as we saw in the Rosenhan study; that is, treating people as a diagnostic category, such as "schizophrenic" or "bipolar" or "autistic," robs them of their individuality by dealing with them as mere objects rather than as individuals.

Depersonalization can easily result from labeling, but, as Rosenhan argued, it can also grow out of the impersonal environment of the mental hospital. All of this, of course, lowers self-esteem and reinforces disordered behavior. Thus, society extracts costly penalties from those identified as deviants from its norms—and in the process, it perpetuates the problem of mental disorder.

Perhaps the most extreme reaction against labeling has come from radical psychiatrist Thomas Szasz (1961, 1977), who claimed that mental illness is a "myth." Szasz argued that

the symptoms used as evidence of mental illness are merely medical labels that give professionals an excuse to intervene in what is really the problem of people who fail to conform to society's expectations. Once labeled, said Szasz, these people can be treated simply for their "problem of being different."

We must keep in mind, therefore, that the goal of diagnosis is not just to fit a person into a neat diagnostic box or to identify those who are "different." Instead, a diagnosis should initiate a process that leads to a greater understanding of a person and to the development of a plan to help. A diagnosis should be a beginning, not an end.

# 12.14: The Cultural Context of Psychological Disorder

**Objective:** **Explain how culture can affect both the symptoms and prevalence of psychological disorders. Give some examples**

These days few clinicians would go as far as Thomas Szasz, but many do advocate an **ecological view** that takes into account the circumstances in which the individual lives (Levine & Perkins, 1987; Lilienfeld & Arkowitz, 2009). Unlike the medical model, this view sees abnormality as an *ecological* interaction between individuals and their social and cultural environments. Disorder results from a mismatch between a person's behavior and the needs of the situation. If you are a private investigator, for example, it might pay to have a slightly suspicious or paranoid complexion to your personality, but if you are a nurse or a teacher, this same characteristic might be called "deviant."

In support of this ecological view, studies show, beyond doubt, that culture influences both the prevalence of psychological disorders and the symptoms that disturbed people display (Jenkins & Barrett, 2004; Matsumoto, 1996). We have seen, for example, that culture influences the content of schizophrenic hallucinations. Similarly, research done by the World Health Organization (1973, 1979) in Colombia, Czechoslovakia, Denmark, India, Nigeria, Taiwan, Britain, the United States, and the former USSR has shown that the very incidence of schizophrenia varies from culture to culture. More recent studies also support this conclusion (Jablensky, 2000).

Psychiatry, too, is beginning to note the effects of culture on psychopathology. The *DSM-5*, in fact, has a section devoted to culture-specific disorders (although this section recognizes no disorders that are found specifically in the United States).

According to psychiatrists Arthur Kleinman and Alex Cohen (1997), psychiatry has clung too long to three persistent myths:

1. The myth that mental disorders have a similar prevalence the world around.

2. The myth that biology creates mental disorder while culture merely shapes the way a person experiences it.

3. The myth that culture-specific disorders occur only in exotic places rather than at home.

But are cultural differences so great that a person who hallucinates might be labeled as having schizophrenia in our culture but a visionary or shaman (a healer or seer) in another?

Jane Murphy (1976) set out to answer this question in a study of two non-Western groups, the Eskimos of northwest Alaska and the Yorubas of rural tropical Nigeria, societies selected because of their wide geographic separation and cultural dissimilarity. In both groups, she found separate terms and distinct social roles for the shaman and for the psychotic individual. Similar findings have since come from studies of other cultures all over the world (Draguns, 1980). If mental illness is a socially defined myth, as Szasz asserts, it is a myth nurtured by cultures everywhere.

---

**Psychology Matters**

## Using Psychology to Learn Psychology

Don't do it! Don't use your new knowledge of psychological disorders to diagnose your family and friends. Violating this caveat has caused grief for many an eager psychology student.

We realize how tempting it is to apply what you are learning to the people in your life. Some of the disorders that we have considered here are common. So, as you read through this chapter, you almost certainly have noticed signs of anxiety, paranoia, depression, mania, and various other impairments of perception, memory, or emotion that remind you of your friends and relatives. It is a variation on the tendency, discussed earlier, to see evidence of psychological disorder in oneself. You should recognize this as a sign that you are acquiring some new knowledge about **psychopathology**. But we suggest that you keep these thoughts to yourself!

Remember that reading one chapter does not make you an expert on psychological disorders; so you should be cautious about making amateur diagnoses. What you especially should *not* do is to tell someone that you think he or she has schizophrenia, bipolar disorder, obsessive–compulsive disorder—or any other mental condition. Don't *label* your friends and family!

Having said that, we should also note that erring too far in the opposite direction by ignoring signs of pathology could also be dangerous. If someone you know is struggling with significant mental problems—and even if he or she asks for your opinion—you should refrain from putting a label on the problem. But you can—and should—encourage that person to see a competent professional for diagnosis and possible treatment.

# Critical Thinking Applied: Insane Places Revisited— Another Look at the Rosenhan Study

Probably no other experiment in the history of psychology has caused such a furor as did Rosenhan's "pseudopatient" study. And no wonder: By raising questions about the reliability of psychiatric diagnosis, it threatened the very foundations of psychiatry and clinical psychology. Rosenhan summarized his study by saying, "It is clear that we cannot distinguish the sane from the insane in psychiatric hospitals." If Rosenhan was right, the whole mental health enterprise might be built on nothing but opinion. But was this the correct conclusion? Let's begin by examining the critical issues.

## Insanity Is Not a Diagnosis

Robert Spitzer (1973), the leader of the original charge against Rosenhan, pointed out that *sanity* and *insanity* are legal terms, as we have seen. Because these terms have no meaning in psychology or psychiatry, says Spitzer, Rosenhan's argument is essentially meaningless. While we can agree that Rosenhan was indeed sloppy with his terminology, your authors suggest that his conclusion has the effect of tossing the baby out with the bath water. In fact, Spitzer admits that Rosenhan apparently uses *insanity* to mean **psychosis**. Score one point for Rosenhan.

## Unfair!

Rosenhan's critics also claimed that the study was unfair because people don't usually lie about their symptoms because they want to be admitted to mental hospitals. And we agree. We should not fault a psychiatrist for assuming that a person asking for help is sincere. Moreover, doctors and hospitals can be held liable if they don't admit people who might pose a danger to themselves or the community (Ostow, 1973). But Rosenhan countered that, even if the doctors were erring on the side of caution, the fact that the patients were "sane" should have been detected, if not at admission, then at some time during their hospitalization. Another point for Rosenhan.

## Not Enough Data

A third criticism targets the narrative approach Rosenhan used in his report of the pseudopatient study. The article told a vivid story, but it was, in fact, sparse in data. Rosenhan's conclusions are mostly driven by his impressions rather than by facts—an irony, in view of his criticism of psychiatric diagnosis as contaminated by unreliable "impressions." We award this one to Rosenhan's critics.

## The Conclusions Were Applied to the Wrong Group

A fourth and most telling criticism accuses Rosenhan of making a rookie error. The failure of psychiatrists to detect "sanity" in the pseudopatients, said Spitzer (1973), tells us nothing about their ability to diagnose real patients—who aren't lying about their symptoms. True enough. But Rosenhan (1973b) replied that his study is only one small part of a vast literature attesting to the unreliability of psychiatric diagnosis: Different psychiatrists quite commonly give different diagnoses to the same patient. Again we give Rosenhan the edge on this one.

## The Other Side Was Biased

We can see the dispute as one between two camps that each perceived themselves under siege by the other. Psychiatrists thought the original study was a frontal assault on the integrity of their profession, so they responded in kind. The counterattack on Rosenhan impugned his integrity as a researcher. The relevant critical thinking question: Could each side's stance be contaminated by bias? The answer is a resounding Yes.

So, where does that leave us?

## What Conclusions Can We Draw?

Without doubt, Rosenhan (1973a) is guilty of using the terms *sane* and *insane* inappropriately. He is also guilty of overstatement, as when he says:

> The facts of the matter are that we have known for a long time that [psychiatric] diagnoses are often not useful or reliable, but we have nevertheless continued to use them. We now know that we cannot distinguish insanity from sanity (p. 257).

Even so, the fact that not one of the pseudopatients was ever discovered to be mentally sound is a startling finding.

## Power of the Situation in Mental Hospitals

More important, in our opinion, is a point to which the critics did not respond: Mental hospitals, said Rosenhan, are not primarily places of treatment. Rather, they are places in which patients are labeled, medicated, and ignored by the staff. Most of the time, Rosenhan found, ward attendants and nurses sequestered themselves in a small staff cubicle that patients called "the cage." Psychiatrists were even less available, making only rare appearances on the wards. When patients approached staff members with questions, they often received curt replies or were ignored.

Rosenhan's study was dramatic, which is why it captured so much public attention. But Rosenhan was not the first person to decry mental hospitals as impersonal places, nor was he the first to offer reasons as to why this might be

so. One reason rests on society's attitudes toward the mentally ill, attitudes that are colored by fear, distrust, and misunderstanding. These attitudes, said Rosenhan, have an effect on mental health workers and the *system* in which they were enmeshed, along with the patients.

A second factor involves **labeling**: the pernicious effect of a psychiatric diagnosis. Once they make a diagnosis, doctors are extremely reluctant to change their minds. This has to do with pride, of course, but an even bigger problem stems from the lack of contact the staff—and especially the doctors—have with patients. Therapy in mental hospitals, then, is largely a matter of dispensing medications.

As we noted at the beginning of the chapter, Rosenhan does not fault the doctors, nurses, ward attendants, or other staff members. He suggested that the problem lay in "the situation"—the whole hospital environment, which depersonalizes patients and discourages staff from interacting with patients. But that was 1973. What about now? Do these problems still plague mental hospitals?

### A New Controversy Erupts

In 2005, author Lauren Slater describes her own reenactment of Rosenhan's classic experiment, in a book titled *Opening Skinner's Box.* In nine visits to different mental hospitals, Slater told doctors that she heard a voice saying, "Thud." Unlike Rosenhan's volunteers, she was usually diagnosed as having "depression with psychotic features." Neither was she hospitalized. But Slater claims that frequently she was prescribed antipsychotic and antidepressant medicines.

Slater's assertion did not go unnoticed by Robert Spitzer, who still sees the Rosenhan experiment as "an embarrassment" (Jaffe, 2006). Spitzer and two of his colleagues responded with a critique of Slater published in the *Journal of Nervous and Mental Disease* (2005). In that piece, they fired back a salvo consisting of their own study, in which they provided 74 psychiatrists with a written vignette based on Slater's "experiment." They claim that only three gave a diagnosis of psychotic depression. (We would note, however, that Slater's experiment has its own biases.)

**The bottom line?** Rosenhan put his finger on some important problems with mental hospitals and psychiatric diagnoses. But he did *not* prove that diagnoses of most mental patients are useless or completely unreliable. And, for our purposes, that conclusion makes the perfect transition to the next chapter, where we will study the treatment of mental disorders.

---

**WRITING PROMPT**

**Psychiatry, Rosenhan, and the Law**

If it was so easy to convince psychiatrists that Rosenhan's pseudopatients were mentally ill, why do you suppose that it is so hard to convince a jury that a defendant is "insane"?

▶ 
> **The response entered here will appear in the performance dashboard and can be viewed by your instructor.**

Submit

---

# Summary: Psychological Disorders

## Chapter Problem

Is it possible to distinguish mental disorder from merely unusual behavior? That is, are there specific signs that clearly indicate mental disorder?

- The line between mental disorder and merely unusual behavior is fuzzy. Everyone agrees that distress, maladaptiveness, irrationality, unpredictability, unconventionality, and undesirable behavior may be symptoms of mental disorder. There are no precise diagnostic tests for most mental disorders. Moreover, the causes of most mental disorders are either disputed or unknown.

- The "medical model," embodied in the *DSM-5*, views mental disorders as specific diseases. The *DSM-5* specifies mental and behavioral symptoms of over 300 mental disorders. This classification system is widely used by the psychiatric community and other mental health professionals.

- The medical model is not universally accepted, however, especially by psychologists, who prefer to view mental disorder from a combination of biological, cognitive, social, behavioral, and developmental perspectives.

## What Is Psychological Disorder?

> **Core Concept 12.1**
>
> The medical model views psychological disorders as "diseases," while the psychological view sees them as an interaction of biological, behavioral, cognitive, developmental, and social-cultural factors.

**Psychopathology** is common in America. Three classic signs suggest severe psychological disorder: **hallucinations**, **delusions**, and extreme **affective disturbances**. But beyond these, the signs of disorder are more subtle, and a diagnosis depends heavily on clinical judgment.

Our modern conception of abnormality has evolved from attributing disorders to demon possession or imbalances of humors to the current **medical model**, which sees psychopathology as "illness" or "disease"—a perspective with which many psychologists disagree. An alternative psychological model includes social-cultural, cognitive, developmental, and behavioral factors as well as biological ones. Aside from the three classic signs of disorder, psychopathology is usually judged by the degree to which a person exhibits distress, maladaptiveness, irrationality, unpredictability, and unconventionality.

It is normal to experience symptoms of psychological disorders on occasion, so psychology students are often unjustifiably concerned that they have a mental disorder. Frequent signs of abnormality, however, should prompt a consultation with a mental health professional.

The plea of **insanity** is often misunderstood by the public, because it is infrequently used and even more infrequently successful. The term *insanity* is a legal term, not a psychological or psychiatric diagnosis.

## How Are Psychological Disorders Classified in the *DSM-5*?

### Core Concept 12.2

The *DSM-5*, the most widely used system for classifying mental disorders, organizes them by their mental and behavioral symptoms.

The *DSM-5* derives from psychiatry and has a bias toward the medical model. The *DSM-5* recognizes more than 300 specific disorders, categorized by symptoms rather than by cause. It has no category for "normal" functioning. Unlike its predecessor, it does not use the term *neurosis*; the term *psychosis* is restricted to a loss of contact with reality.

Among the *DSM-5* categories are the **depressive disorders**, which involve emotional lows. **Major depressive disorder** is the most common of these. **Bipolar disorder** involves both highs and lows, and it occurs less commonly than monopolar depression. Although the causes of these disorders are not clear, all severe mental disorders are believed to have some biological basis. Mysteriously, strong gender differences have been noted in both depressive and bipolar disorders.

The **anxiety disorders** include **generalized anxiety disorder**, **panic disorder**, and the **specific phobias**. The **somatic symptom and related disorders** involve the mind–body relationship in various ways. People with **conversion disorder** have physical symptoms but no organic disease, while those with **illness anxiety disorder** suffer from exaggerated concern about illness.

The *DSM-5* now places **obsessive–compulsive disorder** in a separate category with several other repetitive, uncontrollable, and dysfunctional behaviors.

The controversial **dissociative disorders** include **dissociative amnesia**, **dissociative fugue**, **depersonalization/derealization disorder**, and **dissociative identity disorder**. All disrupt the integrated functioning of memory, consciousness, or personal identity. Among the *psychotic disorders*, **schizophrenia** is the most common. It is characterized by extreme distortions in perception, thinking, emotion, behavior, and language. Evidence for the causes of schizophrenia has been found in a variety of factors including genetics, abnormal brain structure, and biochemistry.

The *DSM-5* also lists a variety of *developmental disorders*, including **autism spectrum disorder**, **dyslexia**, and **attention-deficit hyperactivity disorder**, which typically emerge as a distortion of the normal developmental processes, such as socialization, cognition, and attention. By contrast, the **personality disorders** involve distorted personality traits. Among the commonest are **narcissistic personality disorder**, **antisocial personality disorder**, and **borderline personality disorder**. There are significant gender differences across the spectrum of mental disorder, especially in depression and antisocial personality disorder.

The most common disorders of all are classified in the *DSM-5* as "other conditions that may be a focus of clinical attention." These include a wide range of problems in living. **Shyness** is a widespread problem—and a treatable one—but it is not officially a disorder unless it goes to the extreme of a *social phobia* or *avoidant personality disorder*.

## What Are the Consequences of Labeling People?

### Core Concept 12.3

Ideally, accurate diagnoses lead to proper treatments, but diagnoses may also become labels that depersonalize individuals and ignore the social and cultural contexts in which their problems arise.

**Labeling** someone as psychologically or mentally disordered is ultimately a matter of human judgment. Yet even professional judgments can be biased by prejudices. Those labeled with psychological disorders may suffer **depersonalization** in ways that most physically ill people do not.

Culture has an effect on whether a behavior is called normal, abnormal, or merely unusual, although cross-cultural research suggests that people everywhere distinguish between psychotic individuals and those whom they label shamans, prophets, or visionaries.

## Critical Thinking Applied: Insane Places Revisited—Another Look at the Rosenhan Study

Rosenhan's "pseudopatient" study drew fire from many critics in the psychiatric community. Some objected that "insane" is not a diagnosis; some said it was unfair that the pseudopatients lied about psychotic symptoms; others noted that the study was sparse on data; and still others noted that the results didn't apply to patients with real mental disorders. Nevertheless, Rosenhan's study did point up the **power of the situation** and **labeling** to skew professional judgment in mental hospitals.

## Additional Video Resources

Here are four video resources we think you will find both interesting and of personal value to understanding some of the psychological disorders discussed in this chapter.

**WATCH** New Perspectives on Depression

In this video, Dr. Helen Mayberg explains what is known about depression and the brain. Watch it here: http://www.empowher.com/depression/content/depression-what-latest-research-dr-mayberg-video

**WATCH** Autism

In this video, Temple Grandin talks about overcoming autism. View the video at: https://www.youtube.com/watch?v=nwnlWX4iyj4

**WATCH** Dyslexia

Watch the trailer for a documentary film, *Embracing Dyslexia.* View the trailer at: https://www.youtube.com/watch?v=Vy5WxLf-r6g

# Chapter 13
# Therapies for Psychological Disorders



Derek describes his symptoms of depression to the therapist.

## ⌄ Core Concepts

**13.1** Therapy for psychological disorders takes a variety of forms, but all involve a *therapeutic relationship* focused on improving a person's mental, behavioral, or social functioning.

**13.2** Psychologists employ two main forms of treatment, the insight therapies (focused on developing understanding of oneself and of the problem) and the behavior therapies (focused on changing behavior through conditioning).

**13.3** Biomedical therapies seek to treat psychological disorders by changing the brain's chemistry with drugs, its circuitry with surgery, or its patterns of activity with pulses of electricity or powerful magnetic fields.

**13.4** While a combination of psychological and medical therapies is often better than either one alone for treating mental disorders, most people who have unspecified "problems in living" are best served by psychological treatment alone.

OFF AND ON, DEREK HAD FELT TIRED AND UNHAPPY FOR MONTHS, AND he knew it was affecting not only his work but also his relationship with his partner. Michele, a co-worker and friend, tactfully suggested he seek professional help, but Derek was unsure where to turn. As many people do, he asked for a recommendation from another friend, who he knew had sought therapy 3 years ago. And that is how he ended up, somewhat apprehensively, at Dr. Sturm's office.

She was easy to talk to, it turned out, and it didn't take long for both of them to agree that Derek was depressed. After some conversation about the nature of depression, Dr. Sturm said, "We have several treatment alternatives." She added, "The one in which I am trained is *cognitive–behavioral therapy*, which approaches depression as a learned problem to be treated by changing the way a person thinks about life events and interpersonal relationships. If we take that route, we will explore what is happening at work and at home that might trigger depressive episodes. I would also give you 'homework' every week—assignments designed to help you build on your strengths, rather than focusing on your weaknesses. Just like school," she added with a little laugh.

"As a second option," she said, "I could refer you to a colleague who does *psychodynamic therapy*. If you choose that approach, you and Dr. Ewing would explore your past, looking for events that may have pushed you down the path to the feelings you are experiencing now. Essentially, it would be a treatment aimed at bringing some unpleasant parts of your unconscious mind into the light of day.

"Or, if you prefer, I could send you to my friend, Dr. Kiefer, whose focus is usually on a patient's goals, relationships, and self-esteem. We call that *humanistic therapy.* It deals more with what's on your conscious mind, rather than on the unconscious.

"The other thing I could do is to arrange to get you some medication that has been proven effective in treating depression. It would probably be one of those antidepressants, like Prozac, that you have seen advertised in magazines and on TV. The problem there is that it may take several weeks for them to have an effect. And, besides, I'm not sure they really treat the problems that keep making you feel depressed.

"Oh, yes," she added, "There are some additional medical options, such as electroconvulsive therapy—people often call it 'shock treatment,' but I don't think it is needed in your case."

"Just hearing that makes me feel better," Derek sighed. "So, my choice is between drugs and psychological therapy?"

"Or perhaps a combination of the two," replied Dr. Sturm.

"How do I decide?" Derek asked.

> **CHAPTER PROBLEM: What is the best treatment for Derek's depression: psychological therapy, drug therapy, or both? More broadly, the problem is this: How do we decide among the available therapies for any of the mental disorders?**

Despite the diversity of approaches that Dr. Sturm and her colleagues bring to their work, the overwhelming majority of people who enter **therapy** receive significant help. Not everyone becomes a success case, of course. Some people wait too long, until their problems become intractable. Some do not end up with the right sort of therapy for their problems. And, unfortunately, many people who could benefit from therapy do not get it because of the cost. Still, the development of a wide range of effective therapies is one of the success stories in modern psychology.

As you read through this chapter, we hope you will weigh the advantages and disadvantages of each therapy we discuss. Keep in mind, too, that you may sometime be asked by a friend or relative to use what you, like Derek, have learned here to recommend an appropriate therapy. It's even possible that you may sometime need to select a therapist for yourself. But please keep in mind what this chapter will *not* do: It won't teach you how to do psychotherapy.

# Key Question: What Is Therapy?

> **Core Concept 13.1**
>
> **Therapy for psychological disorders takes a variety of forms, but all involve a *therapeutic relationship* focused on improving a person's mental, behavioral, or social functioning.**

When you think of "therapy," chances are that a stereotype pops into mind, absorbed from countless cartoons and movies: a "neurotic" patient lying on a couch, with a bearded therapist sitting by the patient's head, scribbling notes and making interpretations. In fact, this is a scene from classic Freudian psychoanalysis, which is a rarity today, although it dominated the first half of the 20th century.

The reality of modern therapy differs from the old stereotype on several counts.

- First, most therapists don't require their patients (or *clients*) to lie on a couch.

- Second, people now seek therapeutic help for a wide range of problems besides the serious *DSM-5* disorders: Counselors or therapists also provide help in making difficult choices, dealing with academic problems, and coping with losses or unhappy relationships.

- And here's a third way in which the popular image of therapy is mistaken: Some forms of therapy now involve as much *action* as they do talk and interpretation—as you will see shortly.

At first, the therapeutic menu may appear to offer a bewildering list of choices. But you will see that one

constant threads through them all—as our core concept suggests:

> Therapy for psychological disorders takes a variety of forms, but all involve a therapeutic relationship focused on improving a person's mental, behavioral, or social functioning.

Let's set the stage for our exploration of these many therapies by looking at the variety of people who enter treatment and the problems they bring with them to the therapeutic relationship.

By the end of this section, you will be able to:

**13.1** List the essential components of therapy? Indicate also the professionals who do therapy and what sorts of persons receive therapy

**13.2** Describe how the administration of therapy over time and in different cultures

# 13.1:  Entering Therapy

**Objective:**  **List the essential components of therapy? Indicate also the professionals who do therapy and what sorts of persons receive therapy**

*Why would you go into therapy? Why would anyone?*

Most often, people seek therapy when they have a problem that they are unable to resolve by themselves. They may seek therapy on their own initiative, or they may be advised to do so by family, friends, a physician, or a co-worker.

Obviously, you don't have to be declared "crazy" to enter therapy. But you may be called either a "patient" or a "client." Practitioners who take a biological or medical model approach to treatment commonly use the term *patient*, while the term *client* is usually used by professionals who think of psychological disorders not as mental *illnesses* but as *problems in living* (Rogers, 1951; Szasz, 1961).

Access to therapy depends on several factors. People who have money or adequate health insurance can get therapy easily. For the poor, especially poor ethnic minorities, economic obstacles often block the doorway to professional mental health care (Nemecek, 1999; U.S. Department of Health and Human Services, 2001). Access can also be limited by lack of qualified therapists in many communities. It is often much easier to get help for physical health problems than for psychological problems. Even the nature of the psychological problem can interfere with getting help: Someone with **agoraphobia**, for example, will find it hard, even impossible, to leave home to seek therapy. Similarly, persons with **paranoid symptoms** may not seek help because they don't trust mental health professionals. Obviously, many difficulties stand in the way of getting therapy to all those who need it.

## 13.1.1:  The Therapeutic Alliance and the Goals of Therapy

Sometimes, you simply need to talk out a problem with a sympathetic friend or family member, perhaps just to "hear yourself think." But friends and family not only lack the training to deal with difficult mental problems; they also have needs and agendas of their own that can interfere with helping you. In fact, they may sometimes be part of the problem. For many reasons, then, it may be appropriate to seek the help of a professionally trained therapist. And besides competence, there is also the issue of confidentiality: You will want professional help if you wish to keep your problems and concerns confidential. In all these ways, a professional relationship with a therapist differs from friendship or kinship.

## 13.1.2:  What Are the Components of Therapy?

In nearly all forms of therapy there is some sort of *relationship*, or **therapeutic alliance**, between the therapist and the client seeking assistance—as our core concept indicates. In fact, the quality of the therapeutic alliance is the biggest single factor in the effectiveness of therapy (Wampold & Brown, 2005). (We must admit, however, that there are experimental computer-therapy programs, where the client interacts not with a person but with a computer programmed to simulate a therapist—where the idea of a "relationship" is stretching the point.)

**What, according to you, makes for a good therapeutic alliance?**

You and your therapist must be able to work together as allies, on the same side and toward the same goals, joining forces to cope with and solve the problems that have brought you to therapy (Horvath & Luborsky, 1993; Novotney, 2013). Accordingly, *trust* and *empathy* are two of the essential ingredients. And, as clinicians have become more aware of gender and ethnic diversity among their clientele, research has shown that the most effective therapists are those who can connect with people in the context of their own culture, experience, and native language (Griner & Smith, 2006).

In addition to the relationship between therapist and client, the therapy process typically involves the following steps:

1. **Identifying the problem.** This may mean merely agreeing on a simple description of circumstances or feelings to be changed, or, in the case of a *DSM-5* disorder, this step may lead to a formal diagnosis about what is wrong.

2. **Identifying the cause of the problem or the conditions that maintain the problem.** In some forms of therapy, this involves searching the past, especially childhood, for the source of the patient's or client's discomfort. Alternatively, other forms of therapy emphasize the present causes; that is, the conditions that are keeping the problem alive.

**Table 13.1** Types of Mental Health Care Professionals

| Professional Title | Specialty and Common Work Settings | Credentials and Qualifications |
|---|---|---|
| Counseling psychologist | Provides help in dealing with the common problems of normal living, such as relationship problems, child rearing, occupational choice, and school problems. Typically counselors work in schools, clinics, or other institutions. | Depends on the state: typically at least a master's in counseling, but commonly private practice requires a PhD (Doctor of Philosophy), EdD (Doctor of Education), or PsyD (Doctor of Psychology). |
| Clinical psychologist | Trained primarily to work with those who have more severe disorders, but may also work with clients having less-severe problems; usually in private practice or employed by mental health agencies or by hospitals; not typically licensed to prescribe drugs. | Usually required to hold PhD or PsyD; often an internship and state certification are required. |
| Psychiatrist | A physician with a specialty in treating mental problems—most often by prescribing drugs; may be in private practice or employed by clinics or mental hospitals. | MD (Doctor of Medicine); may be required to be certified by medical specialty board. |
| Psychoanalyst | Practitioners of Freudian therapy; usually in private practice. | MD (some practitioners have doctorates in psychology, but most are psychiatrists who have taken additional training in psychoanalysis.) |
| Psychiatric nurse practitioner | A nursing specialty; licensed to prescribe drugs for mental disorders; may work in private practice or in clinics and hospitals. | Requires RN (Registered Nurse) credential, plus special training in treating mental disorders and prescribing drugs. |
| Clinical or psychiatric social worker | Social workers with a specialty in dealing with mental disorders, especially from the viewpoint of the social and environmental context of the problem. | MSW (Master of Social Work), or LCSW (Licensed Clinical Social Worker): The credential required varies by state. |
| Pastoral counselor | A member of a religious order or ministry who specializes in treatment of psychological disorders; combines spiritual guidance with practical counseling. | Varies by state and by religious denomination. |

3. **Deciding on and carrying out some form of treatment.** This step requires selecting a specific type of therapy designed to minimize or eliminate the troublesome symptoms. The exact treatment will depend on the nature of the problem and on the therapist's orientation and training.

### 13.1.3: Who Does Therapy?

Although more people seek out therapy now than in the past, they typically do so only when their psychological problems become severe or persist for extended periods. Most often they turn to one of seven main types of professional helpers: counseling psychologists, clinical psychologists, psychiatrists, psychoanalysts, psychiatric nurse practitioners, clinical (psychiatric) social workers, or pastoral counselors.

The differences among these specialties are highlighted in Table 13.1. As you examine this table, note that each specialty has its own area of expertise. For example, in most states, the only therapists who are licensed to prescribe drugs are physicians (including psychiatrists) and psychiatric nurse practitioners.

Currently, through their professional organizations, clinical psychologists are seeking to obtain prescription privileges (Sternberg, 2003). In fact, two states, New Mexico and Louisiana, now grant prescription privileges to civilian psychologists who have completed a rigorous training program of course work and a supervised internship (Dittmann, 2003). Similar legislation has been introduced in more than a dozen other states. Meanwhile, the U.S. military has embraced prescription privileges for psychologists (Dittmann, 2004). Nevertheless, the issue remains highly political, contested especially by the medical profession (Fox and others, 2009). Even some clinical psychologists oppose prescription privileges, fearing that psychology will "sell its soul" to serve a public that demands drug therapy. Said former APA President George Albee (2006):

> The current drive for people who are in practice to become drug prescribers is a matter of survival. Society has been sold the fallacy that mental/emotional disorders are all brain diseases that must be treated with drugs. The only way for psychology practitioners to survive is to embrace this invalid nonsense. (p. 3)

Whether or not you agree with Albee, it appears that the era of prescription privileges for properly trained psychologists is coming. It remains to be seen how that will change the face of psychology.

## 13.2: Therapy in Historical and Cultural Context

**Objective:** Describe how the administration of therapy over time and in different cultures

How we treat mental disorders depends on how we *think* about mental disorders. If we believe, for example, that mental problems are *illnesses* or *diseases*, we will treat them differently from those who believe that mental problems indicate a flaw in one's character or the influence of evil spirits. The way any society has treated people with mental disorders has always depended on its prevailing beliefs.

## 13.2.1: History of Therapy

In the days of armored knights, the people of medieval Europe interpreted mental disorder as the work of devils and demons. In that context, then, the job of the "therapist" was to perform an exorcism or to "beat the devil" out of the person with the disorder—to make the body an inhospitable place for a spirit or demon. Alternatively, people with mental disorders were called "lunatics," based on the folk belief that the moon (*luna* in Latin) made them mad. Around the time of the American Revolution, however, reformers adopted a more enlightened view, urging that people with mental disorders be placed in institutions called "asylums," where they could be safely shielded from the stresses of the world. The Islamic world came to similar conclusions about the importance of safe havens for the mentally ill, and in fact established mental asylums several centuries earlier (Elzamzamy & Patel, 2015; Ricardo, 2011). Under such conditions, many patients improved, but unfortunately, the ideal of the "insane asylums" was not always realized.

One of the most infamous of the asylums was also one of the first: Bethlehem Hospital in London, where, for a few pence, weekend sightseers could observe the inmates, who often put on a wild and noisy "show" for the curious audience. As a result, "Bedlam," the shortened term Londoners used for "Bethlehem," became a word used to describe any noisy, chaotic place.

Despite the best of intentions when the asylum movement began, conditions deteriorated as corrupt politicians drained their resources, with the result that most inmates came to receive only custodial care. At worst, they were put in cruel restraints, such as cages and chains, or put on display, as at "Bedlam." Some even received beatings and other forms of abuse reminiscent of the demon-possession days. It's not hard to guess that such perversions of "treatment" in asylums rarely produced improvement in people suffering from psychological disorders.

## 13.2.2: Today's Approaches to Therapy

Modern mental health professionals have abandoned the old demon model and frankly abusive asylum treatments in favor of therapies based on psychological and biological theories of mind and behavior. Yet, as we will see, even modern professionals disagree on the exact causes and the most appropriate treatments—a state of the art that gives us a wide variety of therapies from which to choose. To help you get an overview of this cluttered therapeutic landscape, here is a preview of things to come.

The **psychological therapies** are often called simply *psychotherapy*.[1] They focus on changing disorganized

[1]No sharp distinction exists between counseling and psychotherapy, although in practice *counseling* usually refers to a shorter process, more likely to be focused on a specific problem, while *psychotherapy* generally involves a longer-term and wider-ranging exploration of issues.

thoughts, feelings, and behavior using psychological techniques (rather than biomedical interventions). And they come in two main forms.

- One, called *insight therapy*, focuses on helping people understand their problems and change their thoughts, motives, or feelings.
- The other, known as *behavior therapy*, focuses primarily on behavior change. In fact, many psychotherapists use a combination of the two, known as *cognitive–behavioral therapy*.

In contrast, the **biomedical therapies** focus on treating mental problems by changing the underlying biology of the brain, using a variety of drugs, including antidepressants, tranquilizers, and stimulants. Occasionally the brain may be treated directly with electromagnetic stimulation or even surgery. Some medical therapists use a combination approach involving both drugs and psychotherapy.

## 13.2.3: Disorder and Therapy in a Cultural Context

Ways of thinking about and treating mental disorder vary widely across cultures (Matsumoto, 1996). People in individualistic Western cultures (that is, in Europe and North America) generally regard psychological disorders as the result of disease processes, abnormal genetics, distorted thinking, unhealthy environments, or stressors. But collectivist cultures often have quite different perspectives (Triandis, 1990; Zaman, 1992). Asian societies may regard mental disorder as a disconnect between the person and the group. Likewise, many Africans believe that mental disorder results when an individual becomes

**WATCH** Modern Therapies



When it comes to treating mental disorders, for most mental disorders we have both

Treatment of mental disorder today may involve a combination of psychological and biological therapies.

estranged from nature and from the community, including the community of ancestral spirits (Nobles, 1976; Sow, 1977).

In such cultures, treating mentally disturbed individuals by removing them from society is unthinkable. Instead, healing takes place in a social context, emphasizing a distressed person's beliefs, family, work, and life environment. An African use of group support in therapy has developed into a procedure called "network therapy," where a patient's entire network of relatives, co-workers, and friends becomes involved in the treatment (Lambo, 1978). Such treatments may also involve traditional shamans working alongside mental health professionals trained in modern psychology and psychiatry.

Had Derek lived in such a culture, he would undoubtedly have received treatment from a sorcerer or *shaman* who was assumed to have special mystical powers. His therapy would have involved ceremonies and rituals that bring emotional intensity and meaning into the healing process. Combined with the use of symbols, these rituals connect the individual sufferer, the shaman, and the society to supernatural forces to be won over in the battle against madness (Devereux, 1981; Wallace, 1959).

**A WEST AFRICAN PERSPECTIVE ON PERSONALITY AND MENTAL DISORDER**   Psychiatrist I. Sow of Senegal has proposed a model of personality and mental disorder that captures a West African view of our inner nature, our embeddedness in the community, and our link with the spiritual (Berry and others, 1992; Sow, 1977). Sow's model portrays four levels of personality, the outer two of which, the Senegalese believe, we share with other animals (see Figure 13.1). The outermost layer consists of the physical body, while the next two layers contain life energies. The spirit, or soul, resides at the deepest level—at the core of the personality. In this view, everything but the core perishes at death.

There are, of course, many different African cultures. So it would be a mistake to conclude that Sow's model represents all of them. In general, it best represents the traditional views of indigenous peoples living in Senegal, West Africa.

In the Senegalese belief system, each of the inner layers of personality interacts with its own realm, just as the physical body interacts with objects in the physical environment. The second layer connects to the community and the third layer to one's family. The spiritual core of the personality connects with the world of the ancestral spirits. Because the spirit is distinct from the body, it can wander out of the body during sleep and during trance states. And when the body dies, the spirit leaves permanently to take up residence with the ancestral spirits.

This perspective, then, helps us understand African concepts of illness and mental disorder, says Sow. Physical and mental problems occur when something disturbs the connections between the person and family, community, or ancestors. The most serious mental disturbances arise from disrupted communications with the spirit world, and they are best treated by healers (shamans) who invite spirit possession while in a trance state.

What we in the Euro-American world might call mental illnesses, such as depression or schizophrenia, are seen by West Africans as caused by one's enemies, who have disrupted connections between the third layer of the personality and the community. We would treat them by psychotherapy and drugs. But Senegalese shamans would treat these conditions with charms and by helping to resolve interpersonal conflicts. And if they believe that sorcery has disrupted communication between the second layer of the person and the extended family—resulting in life-threatening illness of the physical body—treatment requires certain rituals to counteract the spell. The results, Sow suggests, are comparable to those achieved by modern psychiatry: some success, some failure. He attributes the successes to the connection in each culture between its own forms of therapy and the belief systems of the people being treated.

**Figure 13.1**  Mental Health and Disorder in West Africa

A West African View of the Person



**Psychology Matters**

## Paraprofessionals Do Therapy, Too

*Does the best therapy always require a highly trained (and expensive) professional—with a master's degree or doctorate in counseling or psychotherapy?*

*Or can **paraprofessionals** be effective therapists?*

If you are seeking treatment, these questions are important because hospitals, clinics, and agencies are increasingly turning to paraprofessionals as a cost-cutting measure: Those who lack full professional credentials can be hired at a fraction of the cost of those with professional degrees. They are often

called "aides" or "counselors" (although many counselors do have professional credentials).

Surprisingly, a review of the literature has found no substantial differences in the effectiveness of the two groups across a wide spectrum of psychological problems (Christensen & Jacobson, 1994). This is good news in the sense that the need for mental health services is far greater than the number of professional therapists can possibly provide. And, because paraprofessional therapists can be effective, highly trained professionals may be freed for other roles, including prevention and community education programs, assessment of patients, training and supervision of paraprofessionals, and research. You should be cautioned about overinterpreting this finding, however. Professionals and paraprofessionals have been found to be equivalent only in the realm of the insight therapies, which we will discuss in a moment (Christensen & Jacobson, 1994; Zilbergeld, 1986). Such differences have not yet been demonstrated in the areas of **behavior therapies**, which require extensive knowledge of **operant conditioning** and **classical conditioning** and of **social learning theory**.

# Key Question: How Do Psychologists Treat Psychological Disorders?

**Core Concept 13.2**

**Psychologists employ two main forms of treatment, the insight therapies (focused on developing understanding of oneself and of the problem) and the behavior therapies (focused on changing behavior through conditioning).**

In the United States and most other Western nations, the sort of therapy Derek receives would depend on whether he had gone to a medical or psychological therapist. By choosing a psychologist like Dr. Sturm, he would almost certainly receive one of the two types of therapy described by the core concept for this section of the chapter:

Psychologists employ two main forms of treatment, the insight therapies (focused on developing understanding of oneself and of the problem) and the behavior therapies (focused on changing behavior through conditioning).

The insight therapies, we shall see, were the first truly psychological treatments developed—and for a long time, they were the only psychological therapies available. In recent years, the insight therapies have been joined by the behavior therapies, which are now among the most effective tools we have (see Figure 13.2). But it is with the insight therapies that we begin.

By the end of this section, you will be able to:

**13.3**  **Describe the main forms of insight therapy in use today**

**13.4**  **Describe the main forms of behavior therapy in use today**

**13.5**  **Explain how cognitive-behavioral therapy is different from both the insight therapies and the behavioral therapies**

**13.6**  **Explain Eysenck's criticism of therapy, and describe the evidence that therapy is effective**

# 13.3:  Insight Therapies

**Objective:** **Describe the main forms of insight therapy in use today**

The **insight therapies** attempt to change people on the inside—changing the way they think and feel. Sometimes called *talk therapies*, these methods share the assumption that distressed persons need to develop an understanding of the maladaptive thoughts, emotions, and motives that underlie their mental difficulties.

The insight therapies come in dozens of different "brands" (see Figure 13.2) but all aim at revealing and changing a

---

**Figure 13.2**  Types of Psychotherapy

Each of the two major branches of psychotherapy has many variations.

patient's disturbed mental processes through discussion and interpretation.

Some psychodynamic therapies, like Freudian **psychoanalysis**, assume that problems lie hidden deep in the unconscious, so they employ elaborate and time-consuming techniques to draw them out.

Others, like Carl Rogers's **client-centered therapy**, minimize the importance of the unconscious and look for problems in the ways people consciously think and interact with each other. We have space here to sample only a few of the most influential ones, beginning with the legendary methods developed by Sigmund Freud himself.

## 13.3.1: Freudian Psychoanalysis

In the classic Freudian view, psychological problems arise from tension created in the unconscious mind by forbidden impulses and threatening memories. Therefore, Freudian therapy, known formally as psychoanalysis, probes the unconscious in an attempt to bring these issues into the "light of day"; that is, into consciousness, where they can be rendered harmless. The major goal of psychoanalysis, then, is to reveal and interpret the wishes, fears, and desires in the unconscious mind.



The psychodynamic therapies focus on the client's *motivation*—either conscious or unconscious. They all originate with Freud.

To get at unconscious material, Freud sought ways to get around the defenses the **ego** has erected to protect itself.

- One ingenious method called for *free association*, by which the patient would relax and talk about whatever came to mind, while the therapist would listen, ever alert for veiled references to unconscious needs and conflicts.
- Another method involved *dream interpretation*, which relies on symbolic cues in the patient's dreams.

With these and other techniques, the psychoanalyst gradually develops a clinical picture of the problem and proceeds to help the patient understand the unconscious causes for symptoms. To give you the flavor of this process, we offer Freud's interpretation of a fascinating case involving a 19-year-old girl diagnosed with "obsessional

neurosis" (now listed in the *DSM-5* as **obsessive–compulsive disorder**). Please bear in mind that Freud's ideas no longer represent the mainstream of either psychology or psychiatry, but they remain important because many of his techniques have carried over into newer forms of therapy. Freud's ideas are also important because many of his concepts, such as **ego**, **repression**, the **unconscious**, **identification**, and the **Oedipus complex**, have become part of our everyday vocabulary. The following case—in which you may find Freud's interpretations shocking—will give you a sense of the way psychotherapy began about a century ago and is still practiced by a few orthodox psychoanalysts.

**A FREUDIAN INTERPRETATION** When Freud's "obsessional" patient entered treatment, she was causing her parents distress with a strange bedtime ritual that she performed each night. As part of this obsessional ritual, she first stopped the large clock in her room and removed other smaller clocks, including her wristwatch. Then, she placed all vases and flowerpots together on her writing table, so—in her "neurotic" way of thinking—they could not fall and break during the night. Next, she assured that the door of her room would remain half open by placing various objects in the doorway. After these precautions, she turned her attention to the bed, where she was careful to ensure that the bolster [a thick pillow] did not touch the headboard and a pillow must lie diagonally in the center of the bolster. Then, she shook the quilt until all the eiderdown feathers sank to the footend, after which she meticulously redistributed them evenly again. And, finally, she would crawl into bed and attempt to sleep with her head precisely in the center of the diagonal pillow.

To complicate matters, the girl never could be sure that she had performed her ritual properly. She would do and then redo first one and then another aspect of the procedure—even though she acknowledged to Freud that all aspects of her nightly precautions were irrational. The result was that it took the girl about 2 hours to get ready for bed each night.

Before you read Freud's interpretation, you might think about how you would make sense of such strange behaviors. Now then, in Freud's (1920/1957) own words, here is the psychoanalytic interpretation of the case:

> The patient gradually learnt to understand that she banished clocks and watches from her room at night because they were symbols of the female genitals. Clocks, which we know may have other symbolic meanings besides this, acquire this significance of a genital organ by their relation to periodical processes and regular intervals. A woman may be heard to boast that menstruation occurs in her as regularly as clockwork. Now this patient's special fear was that the ticking of the clocks would disturb her during

sleep. The ticking of a clock is comparable to the throbbing of the clitoris in sexual excitation. This sensation, which was distressing to her, had actually on several occasions wakened her from sleep; now her fear of an erection of the clitoris expressed itself by the imposition of a rule to remove all going clocks and watches far away from her during the night. Flower-pots and vases are, like all receptacles, also symbols of the female genitals. Precautions to prevent them from falling and breaking during the night are therefore not lacking in meaning. . . . Her precautions against the vases breaking signified a rejection of the whole complex concerned with virginity. . . .

One day she divined the central idea of her ritual when she suddenly understood her rule not to let the bolster touch the back of the bed. The bolster had always seemed a woman to her, she said, and the upright back of the bedstead a man. She wished therefore, by a magic ceremony, as it were, to keep man and woman apart; that is to say, to separate the parents and prevent intercourse from occurring . . .

If the bolster was a woman, then the shaking of the eiderdown till all the feathers were at the bottom, making a protuberance there, also had a meaning. It meant impregnating a woman; she did not neglect, though to obliterate the pregnancy again, for she had for years been terrified that intercourse between her parents might result in another child and present her with a rival. On the other hand, if the large bolster meant the mother then the small pillow could only represent the daughter. . . . The part of the man (the father) she thus played herself and replaced the male organ by her own head.

Horrible thoughts, you will say, to run in the mind of a virgin girl. I admit that; but do not forget that I have not invented these ideas, only exposed them. . . . (pp. 277–279)

We offer you this interpretation, not because we want you to accept it, but rather to show how Freud used the patient's symptoms as symbolic signposts pointing to underlying and unconscious conflicts, desires, and memories. We should remember, however, that Freud was at once a genius *and* a product of his times—the Victorian era, when the culture involved a conflicted prudishness and a fascination with sexuality. Out of modesty, people put pantaloons on the "legs" (considered a naughty word) of their pianos—but, at the same time, were riveted by Freud's daring theories. The point is, that Freud apparently mistook this cultural attitude about sexuality for the cause of mental illness.

**THE PROCESS OF PSYCHOANALYTIC TREATMENT** In the course of treatment, then, Freud would help the obsessional young girl understand how her **ego defense mechanisms** had morphed her unconscious problems into obsessive bedtime rituals centered on sexual fears

and fantasies. Thus, by the ego defense mechanism of **displacement**, her fears about losing virginity became the ritual of protecting the vases in her bedroom. In this way, her ego was able to satisfy her unconscious needs. At the same time, it could keep the "real" problem blocked from consciousness by means of yet another defense mechanism called **repression**.



Sigmund Freud's study, including the famous couch (right), is housed in London's Freud Museum. The 82-year-old Freud fled to London in 1938 upon the Nazi occupation of Austria and died there the following year.

An orthodox Freudian psychoanalyst's main task, then, is to help a patient break through the barriers of repression and bring threatening thoughts to awareness. By doing so, the patient gains insight into the relationship between the current symptoms and the repressed conflicts. Freud argued that, when the patient comes to understand and accept these unconscious conflicts and desires, they will cease to cause trouble.

Ultimately, in the final stage of psychoanalysis, patients learn how the relationship they have established with the therapist reflects unresolved conflicts, especially problems they had with their parents. This projection of parental attributes onto the therapist is called *transference*, and so the final phase of therapy is known as the **analysis of transference**. According to psychoanalytic theory, this last step in recovery occurs when patients are finally released from the unconscious troubles established long ago in the relationship with their parents during early childhood (Munroe, 1955).

## 13.3.2: Neo-Freudian Psychodynamic Therapies

Please pardon your authors for doing a bit of analysis on Freud: He obviously had a flair for the dramatic, and he also possessed a powerful, charismatic personality—or, as he himself might have said, a strong ego. Accordingly, Freud encouraged his disciples to debate the principles of psychoanalysis, but he would tolerate no fundamental changes in his doctrines. This inevitably led to conflicts with some of his equally strong-willed followers, such as Alfred Adler, Carl Jung, and Karen Horney, who eventually

broke away from Freud to establish their own schools of therapy.

In general, these **psychodynamic theories** focus on disturbances in motivation and emotion—usually in the unconscious. True to form, the neo-Freudian renegades kept many of Freud's basic ideas and techniques while adding some and modifying others. In the true psychodynamic tradition, the **neo-Freudian psychodynamic therapies** have retained Freud's emphasis on motivation. Most now have abandoned the psychoanalyst's couch and treat patients face to face. Most also see patients once a week for a few months, rather than several times a week for several years, as in classical psychoanalysis.

**So how do you think modern psychodynamic therapists get the job done in a shorter time?**

Most have shifted their emphasis to *conscious* motivation—so they don't spend so much time probing the unconscious for hidden conflicts and repressed memories. Most have also made a break with Freud by emphasizing one or more of the following points:

- The significance of the conscious self or **ego** (rather than the **id**)
- The influence of experiences occurring throughout life (as opposed to Freud's emphasis on early-childhood experience)
- The role of social needs and interpersonal relationships (rather than sexual and aggressive desires)

Each of the neo-Freudian theorists constructed a theory of disorder and therapy that had a different emphasis. We do not have space here to go into these approaches in greater detail, but let's briefly consider how a modern psychodynamic therapist might have approached the case of the obsessive girl that Freud described. Most likely, such a therapist would focus on the current relationship between the girl and her parents, perhaps on whether she has feelings of inadequacy for which she is compensating by becoming the center of her parents' attention for 2 hours each night. And, instead of working so intensively with the girl, the therapist might also work with the parents on changing the way they deal with the problem. And—to further illustrate the point—what about Derek, the depressed fellow whom we met at the beginning of the chapter? While an orthodox Freudian analyst would probe his early childhood memories for clues as to his depression, the modern psychodynamic therapist would be more likely to look for clues in his current relationships, assuming the cause to be social rather than sexual.

### 13.3.3: Humanistic Therapies

In contrast with the psychodynamic emphasis on conflicting motives, the humanistic therapists believe that mental problems arise from low self-esteem, misguided goals, and unfulfilling relationships. Indeed, the primary symptoms for which college students seek therapy would include feelings of alienation, failure to achieve all they feel they should, difficult relationships, and general dissatisfaction with their lives. Therapists often refer to these problems in everyday existence as *existential crises*, a term emphasizing how many human problems deal with questions about the meaning and purpose of one's existence. The humanistic psychologists have developed therapies aimed specifically at such problems.



Humanistic therapists often help clients deal with low self-esteem, difficult relationships, and *existential crises*.

Again, in contrast with the psychodynamic view, humanistic therapists believe that people are generally motivated by *healthy* needs for growth and psychological well-being. They dispute Freud's assumption of a personality divided into conflicting parts, dominated by a selfish id, and driven by hedonistic instincts and repressed conflicts. Instead, the humanists emphasize the concept of a whole person engaged in a continual process of growth and change.

In the view of the humanistic psychologists, mental disorder occurs when conditions interfere with normal development and produce low self-esteem. **Humanistic therapy**, therefore, attempts to help clients confront their problems by recognizing their own freedom, enhancing their self-esteem, and realizing their fullest potential (Schneider & May, 1995). A humanistic therapist (if there had been one around a century ago) would probably have worked with Freud's patient to explore her self-concept and her feelings about her parents. As for Derek, a humanistic therapist might guess that his depression arose either from unsatisfying relationships or from a sense of personal inadequacy.

**CLIENT-CENTERED THERAPY**   Perhaps the most widespread form of humanistic therapy, **client-centered therapy** was developed by the legendary Carl Rogers (1951, 1977). His approach assumed that healthy development can be derailed by a conflict between one's desire for a positive self-image and criticism by self and others. This conflict creates anxiety and unhappiness. The task of Rogerian client-centered therapy, then, is to create a nurturing environment in which people can work through their concerns and finally achieve self-respect and self-actualization.

In virtual reality, phobic patients confront their fears safely in the behavior therapist's office. On a screen in the headset, the patient sees images of feared situations, such as encountering a snake, flying in an airplane, or looking down from the top of a tall building.

One of the main techniques used by Rogerian therapists involves **reflection of feeling** (also called *reflective listening*) to help clients understand their emotions. With this technique, therapists paraphrase their clients' words, acting as a sort of psychological "mirror" in which clients can see themselves. Notice how the therapist uses this technique to capture the emotional tone expressed by a young woman in the following excerpt from a client-centered therapy session (Rogers, 1951):

> CLIENT: It probably goes all the way back into my childhood. . . . My mother told me that I was the pet of my father. Although I never realized it—I mean, they never treated me as a pet at all. And other people always seemed to think I was sort of a privileged one in the family. . . . And as far as I can see looking back on it now, it's just that the family let the other kids get away with more than they usually did me. And it seems for some reason to have held me to a more rigid standard than they did the other children.
>
> THERAPIST: You're not so sure you were a pet in any sense, but more that the family situation seemed to hold you to pretty high standards.
>
> CLIENT: M-hm. That's just what has occurred to me; and that the other people could sorta make mistakes, or do things as children that were naughty . . . but Alice wasn't supposed to do those things.
>
> THERAPIST: M-hm. With somebody else it would be just—oh, be a little naughtiness; but as far as you were concerned, it shouldn't be done.
>
> CLIENT: That's really the idea I've had. I think the whole business of my standards . . . is one that I need to think about rather carefully, since I've been doubting for a long time whether I even have any sincere ones.
>
> THERAPIST: M-hm. Not sure whether you really have any deep values which you are sure of.
>
> CLIENT: M-hm. M-hm. (p. 152)

Note how most of the therapist's statements in this example paraphrased, or "reflected," what the client has just said.

Is such an approach effective? In fact, client-centered therapy has abundant scientific support. An American Psychological Association task force, charged with finding science-based practices that contribute to the effectiveness of therapy, found that the common factor in therapies that work were precisely the Rogerian qualities of empathy, positive regard, genuineness, and feedback (Ackerman and others, 2001).

## 13.3.4: Cognitive Therapies

The insight therapies we have discussed so far focus primarily on people's emotions or motives.

**Cognitive therapy**, on the other hand, assumes that psychological problems arise from erroneous thinking and sees rational thinking as the key to positive therapeutic change (Butler and others, 2006). Cognitive therapy takes multiple forms, but we can give you some of its flavor with one example: Aaron Beck's cognitive therapy for depression.



Cognitive therapies focus on changing the way clients *think* about themselves and their world.

Beck, who was originally trained in classical psychoanalysis, broke from the Freudian tradition when he began noticing that the dreams and free associations of his depressed patients were filled with negative thoughts (Beck, 1976; Bowles, 2004). Commonly they would make such self-deprecating statements as, "Nobody would like me if they really knew me" and "I'm not smart enough to make it in this competitive school." Gradually, Beck came to believe that depression occurs because of this negative self-talk. The therapist's job, then, is to help the client learn more positive ways of thinking.

Here's a sample of Beck's approach, taken from a therapy session with a college student of about Derek's age (Beck and others, 1979):

> CLIENT: I get depressed when things go wrong. Like when I fail a test.
>
> THERAPIST: How can failing a test make you depressed?
>
> CLIENT: Well, if I fail, I'll never get into law school.

> **THERAPIST:** Do you agree that the way you interpret the results of the test will affect you? You might feel depressed, you might have trouble sleeping, not feel like eating, and you might even wonder if you should drop out of the course.
>
> **CLIENT:** I have been thinking that I wasn't going to make it. Yes, I agree.
>
> **THERAPIST:** Now what did failing mean?
>
> **CLIENT:** (tearful) That I couldn't get into law school.
>
> **THERAPIST:** And what does that mean to you?
>
> **CLIENT:** That I'm just not smart enough.
>
> **THERAPIST:** Anything else?
>
> **CLIENT:** That I can never be happy.
>
> **THERAPIST:** And how do these thoughts make you feel?
>
> **CLIENT:** Very unhappy.
>
> **THERAPIST:** So it is the meaning of failing a test that makes you very unhappy. In fact, believing that you can never be happy is a powerful factor in producing unhappiness. So, you get yourself into a trap—by definition, failure to get into law school equals "I can never be happy." (pp. 145–146)

As you can see from this exchange, the cognitive therapist helps the individual confront the destructive thoughts that support depression. Studies have shown that Beck's approach can be at least as effective in the treatment of depression as is medication (Antonuccio, 1995; Beck, 2005).

In Derek's case, a cognitive therapist would undoubtedly probe for negative self-talk that might be feeding his depression.

*And how might a cognitive therapist have approached Freud's 19-year-old obsessive patient?* The focus would have been on irrational beliefs, such as the idea that flowerpots and vases could, by themselves, fall down in the night and break. A cognitive therapist would also challenge the assumption that something catastrophic might happen (such as not being able to sleep!) if she didn't perform her nightly ritual. In both cases, the assumption would be that the symptoms would disappear as positive thoughts replaced negative ones.

## 13.3.5: Group Therapies

The treatments we have discussed to this point usually involve one-to-one relationships between a patient or client and therapist. Most, however, can also be done with groups of two or more persons. Such **group therapy** offers real advantages over individual therapy, particularly in dealing with troubled interpersonal relationships. In fact, group therapy is often the preferred approach to therapy involving couples, families, or other groups of people who have similar problems, such as depression or drug addiction.



While practitioners from many perspectives use group therapy, they all capitalize on the social milieu of the group.

Therapy groups usually meet face to face once a week, although some groups are experimenting with sessions on the Internet (Davison and others, 2000). In many instances, the therapist employs a humanistic perspective, although psychodynamic and cognitive–behavioral groups are also common. Whatever the method, group therapy offers clients the opportunity to observe and imitate new social behaviors in a forgiving, supportive atmosphere. In the interest of brevity, we will touch on only two representative types of group therapy next: self-help support groups and marital and family therapy.

**SELF-HELP SUPPORT GROUPS**   Perhaps the most noteworthy development in group therapy has been the surge of interest in **self-help support groups**. Thousands of such groups exist. Many are free, especially those that are not directed by a paid health care professional. Such groups give people a chance to meet under nonthreatening conditions to exchange ideas with others having similar problems and who are surviving and sometimes even thriving (Schiff & Bargal, 2000).

One of the oldest support groups, Alcoholics Anonymous (AA) pioneered the self-help concept, beginning in the mid-1930s. Central to the original AA process is the concept of "12 Steps" to recovery from alcohol addiction. It is noteworthy that the 12 Steps are based not on psychological theory but on the trial-and-error experience of early AA members.

In the 1960s, the feminist consciousness-raising movement brought the self-help concept to a wider audience. As a result, self-help support groups now exist for an enormous range of problems, including:

- Managing life transition or other crises, such as divorce or death of a child.
- Coping with physical and mental disorders, such as depression or heart attack.
- Dealing with addictions and other uncontrolled behaviors, such as alcoholism, gambling, overeating, sexual excess, and drug dependency.

- Handling the stress felt by relatives or friends of those who are dealing with addictions.

Group therapy also makes valuable contributions to the treatment of terminally ill patients. The goals of such therapy are to help patients and their families live their lives as fully as possible, to cope realistically with impending death, and to adjust to the terminal illness. One general focus of such support groups for the terminally ill is to help them learn "how to live fully until you say goodbye" (Nungesser, 1990).

**COUPLES AND FAMILY THERAPY**  Perhaps the best setting in which to learn about relationships is with the very people struggling with a relationship. *Couples therapy* (or counseling), for example, may involve a couple who is learning to clarify their communication patterns and improve the quality of their interaction (Napier, 2000). By seeing a couple together (typically just one couple at a time), a therapist can help the partners identify the verbal and nonverbal styles they use to dominate, control, or confuse each other (Gottman, 1994, 1999). The therapist then helps them to reinforce more desirable responses in the other and withdraw from conflicts. Couples are also taught *nondirective* listening skills that help clarify and express feelings and ideas without being confrontational (Jacobson and others, 2000; Wheeler and others, 2001).



In couples therapy, the therapist can help people work together to improve the communication patterns that have developed in their relationship.

In *family therapy*, the "client" is an entire family group, with each family member being treated as part of a *system of relationships* (Fishman, 1993). A family therapist helps troubled family members perceive the issues or patterns that are creating problems for them. The goal is to alter the interpersonal dynamics (interactions) among the participants (Foley, 1979; Schwebel & Fine, 1994). Family therapy not only helps reduce tensions within a family, but it can also improve the functioning of individual members by helping them recognize their roles in the group. It is also proved to be effective in the treatment of **anorexia nervosa**, **depression**, and other **mood disorders**, and even as a boon to families struggling with **schizophrenia** (Miklowitz, 2007).

# 13.4:  Behavior Therapies

**Objective:**  **Describe the main forms of behavior therapy in use today**

If the problem is overeating, bed wetting, shyness, antisocial behavior, or anything else that can be described in purely behavioral terms, the chances are good that it can be modified by one of the behavior therapies (also known as **behavior modification**). Based on the assumption that these undesirable behaviors have been learned and therefore can be *un*learned, **behavior therapy** relies on the principles of **operant conditioning** and **classical conditioning** (see Figure 13.2). In addition to those difficulties listed previously, behavior therapists report success in dealing with fears, compulsions, depression, addictions, aggression, and delinquent behaviors.



Behavior therapists focus on the person's environment and on problem *behaviors*, rather than on internal thoughts, motives, or feelings.

As the label suggests, behavior therapists focus on problem *behaviors* rather than inner thoughts, motives, or emotions. They seek to understand how unwanted behaviors might have been learned and, even more important, how they can be eliminated and replaced by more effective patterns. To see how this is done, we will look first at the behavior therapy techniques borrowed from classical conditioning.

## 13.4.1: Classical Conditioning Therapies

The first use of behavior therapy, reported by psychologist Mary Cover Jones (1924), treated a fearful little boy named Peter, who was terrified of furry objects. Jones was able to desensitize the boy's fear, over a period of weeks, by gradually bringing a rabbit closer and closer to the boy while he was eating. Eventually, Peter was able to allow the rabbit to sit on his lap while he petted it. (You may notice the similarity to John Watson's experiments on Little Albert. Indeed, Jones was an associate of Watson and knew of the Little Albert study. Unlike Albert, however, Peter came to treatment already possessing an intense fear of rabbits and other furry objects.)

Surprisingly, it was another 14 years before behavior therapy reappeared, this time as a treatment for bed wetting (Mowrer & Mowrer, 1938). The method involved a fluid-sensitive pad placed under the patient. When moisture set off an alarm, the patient would awaken. The treatment was effective in 75% of cases—an amazing success rate, in view of the dismal failure of psychodynamic therapy to prevent bed wetting by talking about the "meaning" of the symptom. And yet, it took yet another 20 years before behavior therapy entered the mainstream of psychological treatment.

*Why the delay?* The old Freudian idea—that every symptom has an underlying, unconscious cause that must be discovered and eradicated—was extremely well rooted in clinical lore. Therapists dared not attack symptoms (behaviors) directly for fear of *symptom substitution:* the idea that by eliminating one symptom, another, which could be much worse, could take its place. Happily, this concern turned out to be unfounded.

**SYSTEMATIC DESENSITIZATION**   It took psychiatrist Joseph Wolpe to challenge the entrenched notion of symptom substitution. Wolpe reasoned that the development of irrational fear responses and other undesirable emotionally based behaviors might follow the classical conditioning model rather than the Freudian model. **Classical conditioning** involves the association of a new stimulus with an **unconditioned stimulus** so that the person responds the same way to both. Thus, a fear response might come to be associated with, say, crowds or spiders or lightning. Wolpe also realized another simple truth:

> The nervous system cannot be relaxed and agitated at the same time, because these two incompatible processes cannot be activated simultaneously. Putting these two ideas together laid the foundation for Wolpe's method, called **systematic desensitization** (Wolpe, 1958, 1973).

Systematic desensitization begins with a training program, teaching patients to relax their muscles and their minds (Rachman, 2000). With the patient in this deeply relaxed state, the therapist begins the process of **extinction** by having the patient imagine progressively more fearful situations. This is done in gradual steps, called an *anxiety hierarchy*, that move from remote associations to imagining an intensely feared situation.

To develop the anxiety hierarchy, the therapist and client first identify all the situations that provoke the patient's anxiety and then arrange them in levels, ranked from weakest to strongest (Shapiro, 1995). For example, a patient suffering from severe fear of public speaking constructed the hierarchy of unconditioned stimuli seen in Figure 13.3.

---

**Figure 13.3**  A Sample Anxiety Hierarchy

The following is typical of anxiety hierarchies that a therapist and a patient might develop to desensitize a fear of public speaking. The therapist guides the deeply relaxed patient in imagining the following situations:

1. Seeing a picture or a video recording of another person giving a speech
2. Watching another person give a speech
3. Preparing a speech that I will give to a small group of friends
4. Having to introduce myself to a large group
5. Waiting to be called on to speak in a meeting or in a large class
6. Being introduced as a speaker to a group
7. Walking to the podium to make a speech
8. Making an important speech to a large group

---

Later, during desensitization, the relaxed client vividly imagines the weakest anxiety stimulus on the list. If it can be visualized without discomfort, the client goes on to the next stronger one. After a number of sessions, the client can imagine the most distressing situations on the list without anxiety (Lang & Lazovik, 1963)—hence the term *systematic* desensitization.

It turns out that Wolpe may have been too cautious about inducing anxiety in his clients. In a newer and more intense form of desensitization, known as **exposure therapy**, the therapist may actually have the patient confront the feared object or situation, such as a spider or a snake, rather than just imagining it—and this seems to be even more effective than Wolpe's method (Barlow, 2010). The technique has been used successfully with a multitude of patients with phobias and anxiety disorders, including many whose fears of blood, injections, and germs stand in the way of getting needed medical or dental treatment (Dittmann, 2005).

In the past few years, some behavioral therapists have added a high-tech twist to exposure therapy. By using computer-generated images of fearful situations, their clients can explore and extinguish fears and anxieties in a *virtual-reality* environment that they know is safe. To enter the virtual-reality milieu, patients don a helmet containing a video screen, on which are projected images to which they will be desensitized: spiders, snakes, high places, closed-in spaces—all the common phobia-producing objects or images (Winerman, 2005d).

**AVERSION THERAPY**   So, desensitization and exposure therapy help clients deal with stimuli that they want to avoid. But what about the reverse? What can be done to help those who are attracted to stimuli that are harmful or illegal?

Examples include drug addiction, certain sexual attractions, and tendencies to violence—all problems in which undesirable behavior is elicited by some specific stimulus. **Aversion therapy** tackles these problems with a conditioning procedure designed to make tempting stimuli repulsive by pairing them repeatedly with unpleasant (aversive) stimuli. For example, the therapist might use electric shocks or nausea-producing drugs, whose effects are highly unpleasant but not actually dangerous to the client. In time, the negative reactions **(unconditioned responses)** to the aversive stimuli come to be associated with the **conditioned stimuli** (such as an addictive drug), and so the client develops an aversion that replaces the desire.

To give another example, if you were to elect aversion therapy to help you quit smoking, you might be required to chain-smoke cigarettes while having a foul odor blown in your face—until you develop a strong association between smoking and nausea (see Figure 13.4). A similar conditioning effect occurs in alcoholics who drink while taking Antabuse, a drug often prescribed to encourage sobriety.

**Figure 13.4** Conditioning an Aversion for Cigarette Smoke

Aversion therapy for smoking might simultaneously pair a foul odor with cigarette smoke blown in the smoker's face. The foul odor (such as rotten eggs) produces nausea. This response then becomes the conditioned response associated with cigarette smoke.

SOURCE: Wolpe, J. (1991). *The practice of behavior therapy*, 4th ed. Boston, MA: Allyn & Bacon. Copyright © 1991 by Pearson Education. Reprinted by permission of the publisher.



In some ways, aversion therapy resembles nothing so much as torture. *So why would anyone submit voluntarily to it?* Sometimes, the courts may assign a probationer to aversion therapy. Usually, however, people submit to this type of treatment because they have a troublesome addiction that has resisted other treatments.

## 13.4.2: Operant Conditioning Therapies

Four-year-old Tyler has a screaming fit when he goes to the grocery store with his parents and they refuse to buy him candy. He acquired this annoying behavior through **operant conditioning**, by being rewarded when his parents have given in to his demands. In fact, most behavior problems found in both children and adults have been shaped in this way by rewards and punishments. Consider, for exam-

ple, the similarities between Tyler's case and the employee who chronically arrives late for work or the student who waits until the last minute to study for a test. Changing such behaviors requires operant conditioning techniques.

Let's look at two therapeutic variations on this operant theme.

**CONTINGENCY MANAGEMENT** Tyler's parents may learn to extinguish his fits at the grocery store by simply withdrawing their attention—no easy task, by the way. In addition, the therapist may coach them to "catch Tyler being good" and give him all the attention he needs—but only for good behavior. Over time, the changing contingencies will work to extinguish the old, undesirable behaviors and help to keep the new ones in place. This approach is an example of **contingency management**: changing behavior by modifying its consequences. It has proved effective in treating behavior problems found in such diverse settings as families, schools, work, prisons, the military, and mental hospitals. The careful application of reward and punishment can also reduce the self-destructive behaviors in autistic children (Frith, 1997). And, if you would like to change some undesirable habit or acquire a new one, you can even apply contingency management techniques to yourself: See the accompanying box, *Do It Yourself! Behavior Self-Modification*.

**TOKEN ECONOMIES** A special form of therapy called a **token economy** finds use in group settings such as classrooms and institutions. Think of it as the behavioral version of group therapy (Ayllon & Azrin, 1968; Martin & Pear, 1999). The method takes its name from the plastic tokens sometimes awarded by therapists or teachers as immediate reinforcers for desirable behaviors.

In a classroom application, for example, a student might earn a token for sitting quietly for several minutes, participating in a class discussion, or turning in an assignment. Later, recipients may redeem the tokens for food, merchandise, or privileges. Often, "points" or play money are used in place of tokens. The important thing is that the individual receives something as a reinforcer immediately after giving desired responses. With the appropriate modifications, the token economy also works well with children having developmental disabilities, with mental patients, and with correctional populations (Higgins and others, 2001).

## Do It Yourself!
## Behavior Self-Modification

Is there a habit that you would like to acquire? Let's consider how you might develop the habit of exercising regularly, as an example of a behavior self-modification program that you can adapt to acquiring any new desirable behavior pattern or ridding yourself of an unwanted behavior. In response to the following questions, indicate which answers are appropriate *from a behavioral perspective.*

**Which of the following could be desired behaviors for developing and maintaining your new exercise program?**

Choose as many as you like, but make sure you are specifying only *observable, measurable behaviors.*

1. Writing down your fitness goals
2. Specifying the type of exercise you think you will enjoy
3. Overcoming feelings of laziness, when it is time to exercise
4. Finding an "exercise buddy" who will commit to working with you on your program
5. Feeling better about the condition of your body
6. Recording the duration of each exercise session
7. Looking better in a swimsuit

**Show Answers**

1. Yes, this is a measurable behavior.
2. Yes, this is a measurable behavior.
3. This is a subjective feeling, not an observable behavior.
4. This is a measurable behavior.
5. This is a subjective feeling, not an observable behavior.
6. This is a measurable behavior.
7. This is a subjective feeling, not an observable behavior.

**When or under what conditions would you like to engage in this new behavior?**

Indicate which of the following would be appropriate behaviors.

1. Developing a positive attitude toward my workout routine
2. Following my exercise program at least 5 days a week
3. Calling my exercise partner if I cannot exercise on a particular day

**Show Answers**

1. This is mentalistic; not an observable, measurable behavior.
2. This is a measurable behavior.
3. Yes: This is a measurable behavior.

**Apply some positive reinforcement therapy to yourself to increase your likelihood of producing the desired response.**

Which of the following would be a reward that you could give yourself when you have produced the desired behavior?

1. Buying a new swimsuit, when you have maintained your program for 6 months
2. Noticing that you look better in a swimsuit after 6 months

**Show Answers**

1. Yes, this is a measurable behavior.
2. This is mentalistic; not an observable, measurable behavior.

Give yourself feedback on your progress by keeping a daily record of the occurrence of your new behavior. This could be done, for example, on a calendar or a graph. In time, you will discover that the desired behavior has increased in frequency. You will also find that your new habit carries its own rewards, such as better numbers on your annual physical exam or more satisfying social interactions (Kazdin, 1994).

**Behavior Therapy: What Took It So Long?**

Explain what the concerns were that prevented most clinicians from using behavior therapy techniques to treat disorders such as bed wetting, phobias, and smoking.

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

## 13.4.3: Participant Modeling: An Observational-Learning Therapy

"Monkey see—monkey do," we say. And sure enough, monkeys learn fears by observation and imitation. One study showed that laboratory monkeys with no previous aversion to snakes could acquire a monkey version of *ophidiophobia* (fear of snakes) by observing their parents reacting fearfully to real snakes and toy snakes. The more disturbed the monkey parents were at the sight of the snakes, the greater the resulting fear in their offspring (Mineka and others, 1984). A follow-up study showed that such fears were not just a family matter. When other monkeys that had previously shown no fear of snakes were given the opportunity to observe unrelated adults responding to snakes fearfully, they quickly acquired the same response, as you can see in Figure 13.5 (Cook and others, 1985).

**Figure 13.5** Fear Reactions in Monkeys

Like monkeys, people also learn fears by observing the behavior of others. But for therapeutic purposes, observational learning in the form of participant modeling can also encourage *healthy* behaviors. In **participant modeling**, the client, or participant, observes and imitates someone modeling desirable behaviors. Athletic coaches, of course, have used participant modeling for years. Similarly, a behavior therapist treating a snake phobia might model the desired behavior by first approaching a caged snake, then touching the snake, and so on. The client then imitates the modeled behavior—but at no time is forced to perform. If the therapist senses resistance, the client may return to a previously successful level. As you can see, the procedure is similar to **systematic desensitization**, with the important addition of observational learning. In fact, participant modeling draws on concepts from both operant and classical conditioning.

The power of participant modeling in eliminating snake phobias can be seen in a study that compared the participant modeling technique with several other approaches:

1. *Symbolic modeling*, a technique in which subjects receive indirect exposure by watching a film or video in which models deal with a feared situation

2. Desensitization therapy, which, as you will remember, involves exposure to an imagined fearful stimulus

3. No therapeutic intervention (the control condition)

As you can see in Figure 13.6, participant modeling was the most successful. The snake phobia was virtually eliminated in 11 of the 12 subjects in the participant modeling group (Bandura, 1970).

# 13.5:  Cognitive–Behavioral Therapy: A (Partial) Synthesis

**Objective:**  Explain how cognitive-behavioral therapy is different from both the insight therapies and the behavioral therapies

Suppose you are having difficulty controlling feelings of jealousy every time the person you love is friendly with someone else. Chances are that the problem originates in your cognitions about yourself and the others involved ("Marty is stealing Terry away from me!") These thoughts may also affect your behavior, making you act in ways that could drive Terry away from you. A dose of therapy aimed at *both* your cognitions *and* your behaviors may be a better bet than either one alone.

In brief, **cognitive–behavioral therapy** (CBT) combines a cognitive emphasis on thoughts and attitudes with the behavioral strategies that we have just discussed. This dual approach assumes that an irrational self-statement often underlies maladaptive behavior. Accordingly, the therapist and client work together to modify irrational self-talk, set attainable behavioral goals, develop realistic strategies for attaining them, and evaluate the results. In this way, people change the way they approach problems and gradually develop new skills and a sense of self-efficacy (Bandura, 1986, 1992; DeAngelis, 2008b; Schwarzer, 1992).

**Figure 13.6**  Participant Modeling Therapy

After watching the model, the patient is able to approach the snake. The chart compares participant-modeling therapy with two other therapies, plus a control group.



**WATCH**   Cognitive–Behavioral Therapy

A counselor explains how cognitive–behavioral therapy works in this video: https://www.youtube.com/watch?v=WRRdSm4ZjX4.

**How well does the cognitive–behavioral therapy work? What do you think?**

Quite well, indeed, particularly for depression, anxiety disorders, alcoholism, bulimia nervosa, recurring nightmares, and posttraumatic stress disorder (Baker and others, 2008; Chamberlin, 2008). In fact, it is one of psychology's most prominent success stories. In all of these disorders, CBT can be at least as effective as medication—and sometimes *more* so. For certain other conditions, such as bipolar disorder and schizophrenia, a combination of CBT and medication is more effective than either one alone.

## 13.5.1:  Rational–Emotive Behavior Therapy

One of the most famous forms of cognitive–behavioral therapy was developed by the colorful and notorious Albert Ellis (1987, 1990, 1996) to help people eliminate

self-defeating thought patterns. Ellis dubbed his treatment **rational–emotive behavior therapy (REBT)**, a name derived from its method of challenging certain "irrational" beliefs and behaviors.

What are the irrational beliefs challenged in REBT, and how do they lead to maladaptive feelings and actions? According to Ellis, maladjusted individuals base their lives on a set of unrealistic values and unachievable goals. These "neurotic" goals and values lead people to hold unrealistic expectations that they should *always* succeed, that they should *always* receive approval, that they should *always* be treated fairly, and that their experiences should *always* be pleasant. (You can see the most common irrational beliefs in the accompanying box, *Do It Yourself! Examining Your Own Beliefs*.) For example, in your own daily life, you may frequently tell yourself that you "should" get an A in math or that you "ought to" spend an hour exercising every day. Further, he says, if you are unable to meet your goals and seldom question this neurotic self-talk, it may come to control your actions or even prevent you from choosing the life you want. If you were to enter REBT, your therapist would teach you to recognize such assumptions, question how rational they are, and replace faulty ideas with more valid ones. Don't "should" on yourself, warned Ellis.

**So, how do you think a cognitive–behavioral therapist would have dealt with Freud's obsessive patient?**

First, taking a cognitive approach, the therapist would challenge the girl's irrational beliefs, as we suggested earlier. Then, switching to a behavioral mode, the therapist might teach the girl relaxation techniques to use when she began to get ready for bed each evening. These techniques then would substitute for the obsessive ritual. It is also likely that the therapist would work with the parents, focusing on helping them learn not to reward the girl with attention for her ritual behavior.

Similarly, a cognitive–behavioral therapist would help depressed Derek by challenging the way he *thinks*—perhaps blaming himself less and focusing more on constructive plans for doing better—can ultimately change how he feels and how he acts. Indeed, Peter Lewinsohn and his colleagues have found that they can treat many cases of depression effectively with such cognitive–behavioral techniques (Lewinsohn and others, 1980, 1990; Lewinsohn & Gottlib, 1995). Their approach intervenes at several points in the cycle of depression to teach people how to change their helpless thinking, to cope adaptively with unpleasant situations, and to build more rewards into their lives.

## Do It Yourself!
### Examining Your Own Beliefs

It may be obvious that the following are not healthy beliefs, but Albert Ellis found that many people hold them. Do you? Be honest: Self-examine each of the following statements that accurately describe how you feel about yourself.

1. I must be loved and approved by everyone.
2. I must be thoroughly competent, adequate, and achieving.
3. It is catastrophic when things do not go the way I want them to go.
4. Unhappiness results from forces over which I have no control.
5. People must always treat each other fairly and justly; those who don't are nasty and terrible people.
6. I must constantly be on my guard against dangers and things that could go wrong.
7. Life is full of problems, and I must always find quick solutions to them.
8. It is easier to evade my problems and responsibilities than to face them.
9. Unpleasant experiences in my past have had a profound influence on me. Therefore, they must continue to influence my current feelings and actions.
10. I can achieve happiness by just enjoying myself each day. The future will take care of itself.

In Ellis's view, all these statements were irrational beliefs that can cause mental problems. The more items you have checked, the more "irrational" your beliefs. His cognitive approach to therapy, known as *rational–emotive behavior therapy*, concentrates on helping people see that they can "drive themselves crazy" with such irrational beliefs. For example, a student who parties rather than studying for a test holds belief #8. A person who is depressed about not landing a certain job holds irrational belief #3. You can obtain more information on Ellis's system from his books.

## 13.5.2: Positive Psychotherapy (PPT)

Derek might also be a good candidate for a newer form of cognitive–behavioral treatment called **positive psychotherapy (PPT)**, developed by Martin Seligman. Like the humanists, Seligman and his fellow positive psychologists see their mission as balancing psychology's negative emphasis on mental disorders with their own positive emphasis on growth, health, and happiness. So it was a "natural" for Seligman to tackle the problem of depression by accentuating the positive (Seligman and others, 2006). Unlike the humanists, however, the PPT approach is largely cognitive–behavioral, with an emphasis on research.

In both PPT and Lewinsohn's therapy sessions, Derek might find himself treated more like a student than a patient. For example, the therapist might give him a "homework" assignment, such as the "three good things" exercise: "Before you go to sleep, write down three things that went well today and why they went well." Derek would also learn to focus on positive emotions, respond constructively to others, and otherwise to seek more pleasure in his work and home life. How well does PPT work? Seligman and his

group have applied PPT to dozens of clients and report preliminary results showing that it relieved depression far more effectively than did conventional therapy or antidepressant medication (Seligman and others, 2006).

### 13.5.3: Changing the Brain by Changing the Mind

Brain scans now show that cognitive–behavioral therapy not only helps people change their minds, but it can also change the brain itself (Dobbs, 2006b). In one study, patients who experienced compulsive obsessions, such as frequent worrying that they had not turned off their stoves or locked their doors, were given cognitive behavior modification (Schwartz and others, 1996). When they felt an urge to run home and check on themselves, they were trained to relabel their experience as an obsession or compulsion—not a rational concern. They then focused on waiting out this "urge" rather than giving in to it, by distracting themselves with other activities for about 15 minutes. Positron emission

tomography (PET) scans of the brains of subjects who were trained in this technique indicated that, over time, the part of the brain responsible for that nagging fear or urge gradually became less active.

As that study shows, psychology has come a long way since the days when we wondered whether thoughts and behavior were the product of nature *or* nurture. With cognitive–behavioral therapy, we now know that experience can change the biology behind behavior.

## 13.6: Evaluating the Psychological Therapies

**Objective:** **Explain Eysenck's criticism of therapy, and describe the evidence that therapy is effective**

Now that we have looked at a variety of psychological therapies (see Figure 13.7), let us step back and ask how effective therapy is.

**Figure 13.7** A Comparison of Different Types of Therapy



**Behavior therapies**
aim to change things *outside the individual*: rewards, punishments, and cues in the environment in order to change the person's external behaviors.

**Psychodynamic therapies**
aim to make changes *inside the person's mind*, especially the unconscious.

**Humanistic therapies**
aim to change the way people *see themselves and their relationships*.

**Cognitive therapies**
aim to change the way people *think and perceive*.

**Group therapies**
aim to change the way people *interact*.

**Biomedical therapies**
aim to change the structure or function of the brain with drugs, electromagnetic currents, or surgery.

Think about it: *How could you tell objectively whether therapy really works?* As we will see, the answer to this question hasn't always been clear (Kopta and others, 1999; Shadish and others, 2000).

Lots of evidence says that most people who have undergone therapy *like* it. This was shown, for example, by surveying thousands of subscribers to *Consumer Reports* (1995). Respondents indicated how much their treatment helped, how satisfied they were with the therapist's treatment of their problems, and how much their "overall emotional state" changed following therapy, as well as what kind of therapy they had undergone. Among the results:

(a) Therapy works—that is, it was perceived to have helped clients diminish or eliminate their psychological problems.

(b) Long-term therapy is better than short-term therapy.

(c) All forms of therapy are about equally effective for improving clients' problems (see Jacobson & Christensen, 1996).

We can't give a thumbs-up to therapy, however, merely because people say they like it or that it helped them (Hollon, 1996). Testimonials don't make for good science—which is why psychologists now demand that therapy be judged by studies having a *comparison group* or *control group*. Let's turn, therefore, to the controlled studies of therapy's effectiveness, beginning with a report that nearly upset the therapeutic applecart.

## 13.6.1: Eysenck's Controversial Proclamation

The issue of therapy's effectiveness came to a head in 1952, when British psychologist Hans Eysenck proclaimed that roughly two-thirds of all people who develop nonpsychotic mental disorders would recover within 2 years, *whether they get therapy or not.* Eysenck's evidence came from a review of several outcome studies of various kinds of insight therapy, all of which compared patients who received therapy to those who were on waiting lists, waiting their turn in treatment. What he noted was that just as many people on the waiting lists recovered as those in therapy. If taken at face value, this meant that psychotherapy was essentially worthless—no better than having no treatment at all! To say the least, this wasn't received happily by therapists. But Eysenck's challenge had an immensely productive result: It stimulated therapists to do a great deal of research on the effectiveness of their craft.

**IN RESPONSE TO EYSENCK**   Major reviews of the accumulating evidence on therapy began to be reported in

1970 (by Meltzoff and Kornreich), in 1975 (by Luborsky and others), and in 1977 (by Smith and Glass). Overall, this literature—numbering some 375 studies—supported two major conclusions.

- First, Eysenck had apparently overestimated the improvement rate in no-therapy control groups.
- And second, therapy is, therefore, more effective than no therapy—much to everyone's relief!

Gradually, then, a scientific consensus supporting the value of psychotherapy emerged (Meredith, 1986; VandenBos, 1986). In fact, for a broad range of disorders, psychotherapy has been demonstrated to have an effect comparable or superior to many established medical practices (Wampold, 2007). Moreover, research began to show that therapy was effective not only in Western industrialized countries (in the United States, Canada, and Europe) but also in a variety of cultural settings throughout the world (Beutler & Machado, 1992; Lipsey & Wilson, 1993).

**NEW QUESTIONS**   But the new studies have raised new questions.

- *Are some therapies better than others?*
- *Can we identify therapies that are best suited for treating specific disorders?*

The Smith and Glass (1977) survey hinted that the answers to those questions were "Yes" and "Yes." Smith and Glass found that the behavior therapies seemed to have an advantage over insight therapies for the treatment of many **anxiety disorders**. And as we noted earlier, the use of cognitive–behavioral therapies for treating depression, anxiety disorders, bulimia nervosa, and several other disorders now has solid empirical support. In addition, recent evaluations have found that insight therapies can also be used effectively to treat problems such as marital discord, depression, and even the tough-to-treat personality disorders (Shedler, 2010). Indeed, there is now a clear trend toward matching specific therapies to specific conditions.

Finally, we should note that, in judging the effectiveness of various psychotherapies, it is important to realize that success does not necessarily mean a "cure." Sometimes just making an improvement is all the success we can expect. In the treatment of schizophrenia, intellectual disability, or autism, for example, psychological therapies may be deemed effective when people with these afflictions learn more adaptive behaviors and report leading happier lives (Hogarty and others, 1997).

## Psychology Matters

## Where Do Most People Get Help?

The effectiveness of psychotherapy for a variety of problems seems to be established beyond doubt. Having said that, we should again acknowledge that *most people experiencing mental distress do not turn to professional therapists for help.* Rather, they turn to "just people" in the community (Wills & DePaulo, 1991). Those suffering from mental problems often look to friends, clergy, hairdressers, bartenders, and others with whom they have a trusting relationship. In fact, for some types of problems—perhaps the most common problems of everyday living—a sympathetic friend may be just as effective as a trained professional therapist (Berman & Norton, 1985; Christensen & Jacobson, 1994).

To put the matter in a different way:

Most mental problems are not the crippling disorders that take center stage in the **DSM-5**. Rather, the psychological difficulties most of us face result from lost jobs, difficult marriages, misbehaving children, friendships gone sour, loved ones dying. . . . In brief, the most familiar problems involve chaos, confusion, choice, frustration, stress, and loss. People who find themselves in the throes of these adjustment difficulties may not need extensive psychotherapy, medication, or some other special treatment. They need someone to help them sort through the pieces of their problems. Often, this means that they turn to someone like you.

**So, what will you do if someone asks you for help?**

1. First, you should remember that some problems do indeed require immediate professional attention. These include a suicide threat or an indication of intent to harm others. You should not delay finding competent professional help for someone with such tendencies.

2. Second, you should remember that most therapy methods require special training, especially those calling for cognitive–behavioral therapy techniques or psychodynamic interpretations.

We urge you to learn as much as you can about these methods—but we strongly recommend that you leave them to the professionals. Some other techniques, however, are simply extensions of good human relationships, and they fall well within the layperson's abilities for mental "first aid."

Briefly, we will consider three of these:

- **Listening:** You will rarely go wrong if you just listen. Sometimes listening is all the therapy a person in distress needs. It works by encouraging the speaker to organize a problem well enough to communicate it. Consequently, those who talk out their problems frequently arrive at their own solutions. As an **active listener**, you take the role a step farther by giving the speaker feedback: nodding, maintain-

ing an expression that shows interest, paraphrasing, and asking for clarification when you don't understand. As we saw in the client-centered therapy excerpts earlier, active listening lets the speaker know that the listener is interested and *empathetic* (in tune with the other person's feelings). At the same time, you will do well to avoid the temptation of giving advice. Advice robs the recipient of the opportunity to work out his or her own solutions.

- **Acceptance:** Client-centered therapists call this a *nonjudgmental attitude.* It means accepting the person and the problem as they are. It also means suppressing shock, disgust, or condemnation that would create a hostile climate for problem solving.

- **Exploration of alternatives:** People under stress may see only one course of action, so you can help by identifying other potential choices and exploring the consequences of each. (You can point out that *doing nothing* is also a choice.) Remember that, in the end, the choice of action is not up to you but to the individual who owns the problem.

Beyond these basic helping techniques lies the territory of the trained therapist. Again, we strongly advise you against trying out the therapy techniques discussed in this chapter for depression, phobias, anxiety disorders, or any of the other serious psychological disorders listed in the *DSM-5.*

# Key Question: How Is the Biomedical Approach Used to Treat Psychological Disorders?

**Core Concept 13.3**

**Biomedical therapies seek to treat psychological disorders by changing the brain's chemistry with drugs, its circuitry with surgery, or its patterns of activity with pulses of electricity or powerful magnetic fields.**

The mind exists in a delicate biological balance. It can be upset by irregularities in our genes, hormones, enzymes, and metabolism, as well as by damage from accidents and disease. When something goes wrong with the brain, we can see the consequences in abnormal patterns of behavior or peculiar cognitive and emotional reactions. The biomedical therapies, therefore, attempt to treat these mental disorders by intervening directly in the brain. Our core concept specifies the targets of these therapies:

Biomedical therapies seek to treat psychological disorders by changing the brain's chemistry with drugs, its circuitry with surgery, or its patterns of activity with pulses of electricity or powerful magnetic fields.

Each of the biomedical therapies emerges from the medical model of abnormal mental functioning, which assumes an organic basis for mental illnesses and treats them as diseases. We begin our examination of these biomedical therapies with medicine's arsenal of prescription psychoactive drugs.

By the end of this section, you will be able to:

**13.7** Describe the role of drugs in treating mental disorders

**13.8** Explain how psychosurgery and brain-stimulation therapies are used to treat psychological disorders

**13.9** Describe the history of mental hospitals in the United States

# 13.7: Drug Therapies

**Objective:** Describe the role of drugs in treating mental disorders

In the history of the treatment of mental disorder, nothing has ever rivaled the revolution created by the discovery of drugs that could calm anxious patients, elevate the mood of depressed patients, and suppress hallucinations in psychotic patients. This brave new therapeutic era began in 1953 with the introduction of the first antipsychotic drugs (often called "tranquilizers"). As these drugs found wide application, many unruly, assaultive patients almost miraculously became cooperative, calm, and sociable. In addition, many thought-disordered patients, who had previously been absorbed in their delusions and hallucinations, began to respond to the physical and social environment around them.

The effectiveness of drug therapy had a pronounced effect on the census of the nation's mental hospitals. In 1955, more than half a million Americans were living in mental institutions, each staying an average of several years. Then, with the introduction of tranquilizers, the numbers began a steady decline. In just over 10 years, fewer than half that number actually resided in mental hospitals, and those who did were usually kept for only a few months.

Drug therapy has long since steamrolled out of the mental hospital and into our everyday lives. Currently, millions of people take drugs for anxiety, stress, depression, hyperactivity, insomnia, fears and phobias, obsessions and compulsions, addictions, and numerous other problems. Clearly, a drug-induced revolution has occurred.

**But what are these miraculous drugs?**

You have probably heard of Prozac and Valium, but those are just two of scores of psychoactive drugs that can alter your mood, your perceptions, your desires, and perhaps even your basic personality. Here, we will consider four major categories of drugs used today:

- Antipsychotics
- Antidepressants and mood stabilizers
- Antianxiety drugs
- Stimulants

## 13.7.1: Antipsychotic Drugs

As their name says, the **antipsychotics** treat the symptoms of psychosis: delusions, hallucinations, social withdrawal, and agitation (Dawkins and others, 1999). Most work by reducing the activity of the neurotransmitter dopamine in the brain—although the precise reason why this has an antipsychotic effect is not known. For example, *chlorpromazine* (sold under the brand name Thorazine) and *haloperidol* (brand name: Haldol) are known to block dopamine receptors in the synapse between nerve cells. A newer antipsychotic drug, *clozapine* (Clozaril), both decreases dopamine activity and increases the activity of another neurotransmitter, serotonin, which also inhibits the dopamine system (Javitt & Coyle, 2004; Sawa & Snyder, 2002). While these drugs reduce overall brain activity, they do not merely "tranquilize" the patient. Rather, they reduce schizophrenia's "positive" symptoms (hallucinations, delusions, emotional disturbances, and agitated behavior), although they do little for the "negative" symptoms of social distance, jumbled thoughts, and poor attention spans seen in many patients (Wickelgren, 1998a). Newer drugs have come online in recent years, but a recent study suggests that, for reducing psychotic symptoms, these "second generation" antipsychotic drugs may be no more effective than the older ones (Lieberman and others, 2005; Rosenheck and others, 2006).

Unfortunately, long-term administration of any antipsychotic drug can have unwanted side effects. Physical changes in the brain have been noted (Gur & Maany, 1998). But most worrisome is **tardive dyskinesia**, which produces an incurable disturbance of motor control, especially of the facial muscles. Although some of the newer drugs, like clozapine, have reduced motor side effects because of their more selective dopamine blocking, they also can cause serious problems.

**Are antipsychotic drugs worth the risk?** There is no easy answer. The risks must be weighed against the severity of the patient's current suffering.

## 13.7.2: Antidepressants and Mood Stabilizers

The drug therapy arsenal also includes several compounds that have revolutionized the treatment of depression and

bipolar disorder. As with other psychoactive drugs, neither the antidepressants nor mood stabilizers can provide a "cure." Their use, however, has made a difference in the lives of many people suffering from depression and bipolar disorder.

**ANTIDEPRESSANT DRUGS**   All three major classes of **antidepressants** work by "turning up the volume" on messages transmitted over certain brain pathways, especially those using norepinephrine and serotonin (Holmes, 2001).

1. *Tricyclic* compounds such as Tofranil and Elavil reduce the neuron's reabsorption of neurotransmitters after they have been released in the synapse between brain cells—a process called **reuptake**.

2. A second group includes the famous antidepressant Prozac (fluoxetine). These drugs, known as SSRIs (selective serotonin reuptake inhibitors), interfere with the reuptake of serotonin. As a result, the SSRIs keep serotonin available longer. For many people, this prolonged serotonin effect lifts depressed moods (Hirschfeld, 1999; Kramer, 1993).

3. The third group of antidepressant drugs, the *monoamine oxidase (MAO) inhibitors*, limits the activity of the enzyme MAO, a chemical that breaks down norepinephrine in the **synapse**. When MAO is inhibited, more norepinephrine is available to carry neural messages across the synaptic gap.

Strangely, most patients report that it takes at least a couple of weeks before antidepressants begin to lift the veil of depression. Two recent lines of research suggest possible reasons why this is so.

- In one experiment, depressed patients who took a common antidepressant showed markedly increased responses to positive stimuli within a matter of hours, even though an improvement in the overall depressive mood took much longer (Harmer and others, 2009). According to the experimenters, the drugs seem to reverse a "negative bias" in a patient's interpretation of emotional events—so that the world is seen through a "rosier lens." However, improvement in mood does not happen right away, because the patient needs time to adjust to a more positive outlook (Harmer & Pariante, 2012; Makin, 2014).

- The second line of research shows, in animal studies, that antidepressants stimulate the growth of neurons in the brain's **hippocampus**—and this takes time, too. No one is sure why the hippocampus seems to be involved in depression, but this work offers another tantalizing clue: Stress slows the growth of new neurons in this part of the brain—and depres-

sion is believed to be a stress response (Santarelli and others, 2003).

The possibility of suicide poses a special concern in the treatment of depression. Most medical practitioners would agree that drugs reduce the probability of suicide (Bower, 2007; Harmer & Pariante, 2012). But there are studies suggesting that the very drugs used for treating depression may provoke or amplify suicidal thoughts, particularly during the first few weeks of therapy and especially in children and adolescents (Bower, 2004). One report finds that the increased short-term risk is small—less than 1% (Bridge and others, 2007). Obviously, the picture is confusing at the moment, and the Food and Drug Administration is advising prescribers to use caution (Bower, 2006b; Jick and others, 2004).

**CONTROVERSY OVER SSRIS**   In his book *Listening to Prozac*, psychiatrist and Prozac advocate Peter Kramer (1993) encourages the use of the drug to deal not only with depression but also with general feelings of social unease and fear of rejection. Such claims have brought heated replies from therapists who fear that drugs may merely mask the psychological problems that people need to face and resolve. Some worry that the wide use of antidepressants may produce changes in the personality structure of a huge segment of our population—changes that could bring unanticipated social consequences (Breggin & Breggin, 1994; Sleek, 1994). In fact, more prescriptions are being written for antidepressants than there are people who have been diagnosed with clinical depression (Coyne, 2001). The problem seems to be especially acute on college and university campuses, where increasing numbers of students are taking antidepressants (Young, 2003). At present, no one knows what the potential dangers might be of altering the brain chemistry of large numbers of people over long periods.

Just as worrisome for the medical model, another report suggests that antidepressants may owe nearly as much to their hype as to their effects on the brain. According to data mined from the Food and Drug Administration files, studies showing positive results find their way into print far more often than do studies showing no effects for these medicines. While these drugs do better overall than placebos, reports of their effects seem to be exaggerated by selective publication of positive results (Turner and others, 2008).

**MOOD STABILIZERS**   A simple chemical, *lithium* (in the form of *lithium carbonate*), has proved highly effective as a mood stabilizer in the treatment of bipolar disorder (Paulus, 2007; Schou, 1997). Not just an antidepressant,

lithium affects both ends of the emotional spectrum, dampening swings of mood that would otherwise range from uncontrollable periods of hyperexcitement to the lethargy and despair of depression. Unfortunately, lithium also has a serious drawback: In high concentrations, it is toxic. Physicians have learned that safe therapy requires that small doses be given to build up therapeutic concentrations in the blood over a period of a week or two. Then, as a precaution, patients must have periodic blood analyses to ensure that lithium concentrations have not risen to dangerous levels. In a welcome development, scientists have found a promising alternative to lithium for the treatment of bipolar disorder (Azar, 1994; Walden and others, 1998). *Divalproex sodium* (brand name: Depakote), originally developed to treat epilepsy, seems to be even more effective than lithium for most patients but with fewer dangerous side effects (Bowden and others, 2000).

### 13.7.3:  Antianxiety Drugs

To reduce stress and suppress anxiety associated with everyday hassles, untold millions of Americans take **antianxiety drugs**, either barbiturates or benzodiazepines.

- Barbiturates act as central nervous system depressants, so they have a relaxing effect. But barbiturates can be dangerous if taken in excess or in combination with alcohol.
- By contrast, the benzodiazepines, such as Valium and Xanax, work by increasing the activity of the neurotransmitter GABA, thereby decreasing activity in brain regions more specifically involved in feelings of anxiety. The benzodiazepines are sometimes called "minor tranquilizers."

Many psychologists believe that these antianxiety drugs—like the antidepressants—are too often prescribed for problems that people should face rather than mask with chemicals. Nevertheless, antianxiety compounds can be useful in helping people deal with specific situations, such as anxiety prior to surgery. Here are some cautions to bear in mind about these compounds (Hecht, 1986):

- If used over long periods, barbiturates and benzodiazepines can be physically and psychologically addicting (Holmes, 2001; Schatzberg, 1991).
- Because of their powerful effects on the brain, these medicines should not be taken to relieve anxieties that are part of the ordinary stresses of everyday life.
- When used for extreme anxiety, antianxiety drugs should not normally be taken for more than a few days

at a time. If used longer than this, their dosage should be gradually reduced by a physician. Abrupt cessation after prolonged use can lead to withdrawal symptoms, such as convulsions, tremors, and abdominal and muscle cramps.
- Because antianxiety drugs depress parts of the central nervous system, they can impair one's ability to drive, operate machinery, or perform other tasks that require alertness (such as studying or taking exams).
- In combination with alcohol (also a central nervous system depressant) or with sleeping pills, antianxiety drugs can lead to unconsciousness and even death.

Finally, we should mention that some antidepressant drugs have also been found useful for reducing the symptoms of certain anxiety disorders such as panic disorders and agoraphobia, as well as obsessive–compulsive disorder. (A modern psychiatrist might well have prescribed antidepressants for Freud's obsessive patient.) But because these problems may arise from low levels of serotonin, they may respond even better to drugs like Prozac that specifically affect serotonin function.

### 13.7.4:  Stimulants

Ranging from caffeine to nicotine to amphetamines to cocaine, any drug that produces excitement or hyperactivity falls into the category of **stimulants**. We have seen that stimulants can be useful in the treatment of narcolepsy. They also have an accepted niche in treating **attention-deficit hyperactivity disorder (ADHD)**. While it may seem strange to prescribe stimulants (a common one is Ritalin) for hyperactive children, studies comparing stimulant therapy with behavior therapy and with placebos have shown a clear role for stimulants (American Academy of Pediatrics, 2001; Meyers, 2006). Although the exact mechanism is unknown, stimulants may work in hyperactive children by increasing the availability of dopamine, glutamate, and/or serotonin in their brains (Gainetdinov and others, 1999).

As you can imagine, the use of stimulants to treat ADHD has generated controversy (O'Connor, 2001). Some objections, of course, stem from ignorance of the well-established calming effect these drugs have in children with this condition. Other worries have more substance. For some patients, the drug will interfere with normal sleep patterns. Additionally, there is evidence that stimulant therapy can slow a child's growth (National Institute of Mental Health, 2006). Legitimate concerns also center on the potential for abuse that lurks in the temptation to see every child's behavior problem as a symptom of ADHD (Smith, 2002a). And finally, critics

suggest that the prescription of stimulants to children might encourage later drug abuse (Daw, 2001). Happily, recent studies have found cognitive–behavioral therapy (CBT) to be comparable to stimulants as a treatment for ADHD (Sinha, 2005). Even better, say many experts, is a *combination therapy* regimen that employs both CBT and stimulants.

## 13.7.5:  Evaluating the Drug Therapies

The drug therapies have caused a revolution in the treatment of severe mental disorders, starting in the 1950s, when virtually the only treatments available were talk therapies, hospitalization, restraints, "shock treatment," and lobotomies. Of course, none of the drugs discovered so far can "cure" any mental disorder. Yet, in many cases, they can alter the brain's chemistry to suppress symptoms.

---

**WATCH** Drugs and Therapy

Drugs alone are not usually enough to treat psychological disorders effectively. Watch this video to learn more: https://www.youtube.com/watch?v=Ery8RHHEfIM

**But is all the enthusiasm warranted?** According to neuroscientist Elliot Valenstein (1998), a close look behind the scenes of drug therapy raises important questions (Rolnick, 1998). Valenstein believes that much of the faith in drug therapy for mental disorders rests on hype. He credits the wide acceptance of drug therapy to the huge investment drug companies have made in marketing their products. Particularly distressing are concerns raised about the willingness of physicians to prescribe drugs for children—even though the safety and effectiveness of many drugs has not been established in young people (K. Brown, 2003a).

Few question that drugs are the proper first line of treatment for certain conditions, such as bipolar disorder and schizophrenia. In many other cases, however, the apparent advantages of drug therapy are quick results and low cost. Yet some research raises doubts about simplistic time-and-money assumptions. Studies show, for example, that treating depression, anxiety disorders, and eating disorders with cognitive–behavioral therapy—alone or in combination with drugs—can be both more effective and more economical in the long run than reliance on drugs alone (Clay, 2000; Smith, 2012). Despite the evidence, however, the use of psychotherapy has dwindled in recent years, while medication-only treatment has increased, perhaps because the drug advertising has been so heavily targeted at the public (Nordal, 2010; Olfson & Marcus, 2010).

# 13.8:  Other Medical Therapies for Psychological Disorders

**Objective:** Explain how psychosurgery and brain-stimulation therapies are used to treat psychological disorders

The headline in the *Los Angeles Times* read, ".22-Caliber Surgery Suicide Bid Cures Psychological Disorder" (February 23, 1988). The accompanying article revealed that a 19-year-old man suffering from severe obsessive–compulsive disorder had shot a 0.22 caliber bullet through the front of his brain in a suicide attempt. Remarkably, he survived, his pathological symptoms were gone, and his intellectual capacity was not affected.

We don't recommend this form of therapy, but the case does illustrate the potential effects of physical intervention in the brain. In this vein, we will look briefly at two medical alternatives to drug therapy that were conceived to alter the brain's structure and function:

- **Psychosurgery**
- **Direct stimulation of the brain**

## 13.8.1:  Psychosurgery

Surgeons have long aspired to treat mental disorders by severing connections between parts of the brain or by removing small sections of brain. Today **psychosurgery** is usually considered a method of last resort. Nevertheless, the practice has a history dating back at least to medieval times, when surgeons might open the skull to remove "the stone of folly" from an unfortunate madman. (There is, of course, no such "stone"—and there was no anesthetic except alcohol for these procedures.)

In modern times, the best-known form of psychosurgery involved the now-discredited *prefrontal lobotomy*. This operation, developed by Portuguese psychiatrist Egas Moñiz,[2] severed certain nerve fibers connecting the **frontal lobes** with deep brain structures, especially those of the **thalamus** and **hypothalamus**—much like what happened accidentally to the famous, but unfortunate, Phineas Gage, who suffered a personality change when a blasting accident drove an iron rod through his frontal lobe. The original candidates for Moñiz's scalpel were agitated schizophrenic patients and patients who were compulsive and anxiety

---

[2]In an ironic footnote to the history of psychosurgery, Moñiz was shot by one of his disgruntled patients, who apparently had not become as pacified as Moniz had expected. This fact, however, did not prevent Moñiz from receiving the Nobel Prize for Medicine in 1949.

ridden. Surprisingly, this rather crude operation often produced a dramatic reduction in agitation and anxiety. On the down side, the operation permanently destroyed basic aspects of the patients' personalities. Frequently, they emerged from the procedure crippled by a loss of interest in their personal well-being and their surroundings. As experience with lobotomy accumulated, doctors saw that it destroyed patients' ability to plan ahead, made them indifferent to the opinions of others, rendered their behavior childlike, and gave them the intellectual and emotional flatness of a person without a coherent sense of self. Not surprisingly, when the antipsychotic drug therapies came on the scene in the 1950s, with a promise to control psychotic symptoms with no obvious risk of permanent brain damage, the era of lobotomy came to a close (Valenstein, 1980).

Psychosurgery is still occasionally done, but it is now much more limited to precise and proven procedures for very specific brain disorders. In the "split-brain" operation, for example, severing the fibers of the **corpus callosum** can reduce life-threatening seizures in certain cases of epilepsy, with relatively few side effects. Psychosurgery is also done on portions of the brain involved in pain perception in cases of otherwise intractable pain. Today, however, no *DSM-5* diagnoses are routinely treated with psychosurgery.

## 13.8.2: Brain-Stimulation Therapies

Electrical stimulation of the brain, also known as **electroconvulsive therapy (ECT)**, is still widely used, especially in patients with severe depression who have not responded to drugs or psychotherapy for depression. (You will recall that the therapist said that Derek was not a good candidate for ECT.) The treatment induces a convulsion by applying an electric current (75 to 100 volts) to a patient's temples briefly—from one-tenth to a full second. The convulsion usually runs its course in less than a minute. Patients are prepared for this traumatic intervention by putting them to "sleep" with a short-acting barbiturate, plus a muscle relaxant. This not only renders them unconscious but minimizes any violent physical spasms during the seizure (Abrams, 1992; Malitz & Sackheim, 1984). Within half an hour, the patient awakens but has no memory of the seizure or of the events preparatory to treatment.

**Does it work?** Crude as it may seem to send an electric current through a person's skull and brain, studies have shown ECT to be a useful tool in treating depression, especially those in whom suicidal tendencies demand an intervention that works far more quickly than medication or psychotherapy (Lilienfeld & Arkowitz, 2014; Shorter & Healy, 2007). Typically, the symptoms of depression often abate in a 3- or 4-day course of treatment, in contrast with the 1- to 2-week period required for drug therapy.

Although most clinicians regard ECT, properly done, as safe and effective, some critics fear that it also could be abused to silence dissent or punish patients who are uncooperative (Butcher and others, 2008; Holmes, 2001). Other worries about ECT stem from the fact that its effects are not well understood. To date, no definitive theory explains why inducing a mild convulsion should alleviate disordered symptoms, although there are some hints that it may stimulate neuron growth in parts of the brain, particularly the **hippocampus**.

Most worrisome, perhaps, are the memory deficits sometimes caused by electroconvulsive therapy (Breggin, 1979, 1991). Proponents claim, however, that patients generally recover full memory functions within months of the treatment (Calev and others, 1991). In the face of such concerns, the National Institute of Mental Health investigated the use of ECT and, in 1985, gave it a cautious endorsement for treating a narrow range of disorders, especially severe depression. Then, in 1990, the American Psychiatric Association also proclaimed ECT to be a valid treatment option. To minimize even short-term side effects, however, ECT is usually administered "unilaterally"—only to the right temple—to reduce the possibility of speech impairment.

A promising new therapeutic tool for stimulating the brain with magnetic fields may offer the benefits of ECT without the risk of memory loss. Still in the experimental stages, **transcranial magnetic stimulation (TMS)** involves directing high-powered magnetic stimulation to specific parts of the brain. Studies indicate that TMS may be useful for treating not only depression but also schizophrenia and bipolar disorder (George, 2003; Weir, 2013). Because TMS therapy, unlike electroconvulsive therapy, does not require sedation or produce a seizure, researchers hope also that it offers a safer alternative to ECT.

**How effective is TMS?** In studies so far, some 35% to 40% of patients with severe depression experience improvement in their symptoms, lasting several months (George and others, 2013). How good is that? These results equal or surpass those of patients taking antidepressant medications. Researchers hope that combining TMS with cognitive–behavioral therapy will be even more effective.

Recently, neurologist Helen Mayberg has reported using *deep brain stimulation*, which requires the surgical implantation of a microelectrode through a small hole in the skull and directly into the brain, where it delivers a continual trickle of electric current to selected regions of the frontal lobes. Dr. Mayberg likens the treatment to a "pacemaker" for an area of cortex that seems to range out of control in depression (Gutman, 2006; Price, 2009). Although the treatment has been used on only a few patients, Mayberg reports highly encouraging outcomes (Mayberg and others, 2005). She views it not as an alternative to other therapies but as a promising last resort for severely depressed patients who have not responded to other therapies.

# 13.9:  Hospitalization and the Alternatives

**Objective:**   **Describe the history of mental hospitals in the United States**

We have seen that mental hospitals were originally conceived as places of refuge—"asylums"—where disturbed people could escape the pressures of normal living. In fact, they often worked very well (Maher & Maher, 1985). But by the 20th century, these hospitals had become overcrowded and, at best, little more than warehouses for the disturbed with nowhere else to go. Rarely were people with money committed to these institutions; instead, they were given private care, including individual psychotherapy (Doyle, 2002a).

The drugs that so profoundly altered treatment in mental hospitals did not appear until the 1950s. In the interim, institutionalized patients often found themselves controlled by straitjackets, locked rooms, and, sometimes, lobotomies. Meanwhile, in the large public mental hospitals, what passed for psychotherapy was a feeble form of "group therapy" performed on a whole ward—perhaps 50 patients—at a time. Too many patients, too few therapists, and too little time devoted to therapy meant that little, if any, real benefit accrued.

## 13.9.1:  Deinstitutionalization and Community Mental Health

The advent of antipsychotic drugs ushered in huge changes. Thousands of patients who responded to the new drugs were sent home for outpatient treatment. The goal of **deinstitutionalization** was to return as many patients as possible to their communities, where they would (it was hoped) thrive in a familiar and supportive environment. The concept also gained popularity with politicians, who saw large sums of money being poured into mental hospitals (filled, incidentally, with nonvoting patients). Thus, by the 1970s, a consensus formed among politicians and mental health professionals that the major locus of treatment should shift from mental hospitals back to the community. There, both psychological and drug therapies would be dispensed from walk-in clinics, and recovering patients could live with their families, in foster homes, or in group homes. This vision became known as the **community mental health movement**.

Unfortunately, the reality did not match the vision (Doyle, 2002a; Torrey, 1996, 1997). Community mental health clinics—the centerpieces of the community mental health movement—rarely received the full funding they needed. Chronic patients were released from mental hospitals, but they often returned to communities that could offer them few therapeutic resources and to families ill

equipped to cope with them (Smith and others, 1993). As a result, mental patients who needed care filled the psychiatric wards at local general hospitals—rather than mental hospitals. The consequence: Hospital care has continued to consume a large share of mental health expenditures in the United States (Kiesler, 1993; U.S. Department of Health and Human Services, 2002).



Deinstitutionalization put mental patients back in the community—but often without adequate resources for continued treatment. Many of these people have ended up on the street and homeless.

Despite the dark picture we have painted, community treatment has had some successes. After a review of 10 studies in which mental patients were randomly assigned to hospital treatment or to various community treatment programs, Kiesler (1982) reported that patients more often improved in the community-based programs—when they were available. Further, those given community-based treatment were less likely to be hospitalized at a later date. When these programs have adequate resources, they can be highly effective (McGuire, 2000).

## 13.9.2:  Meeting the Unmet Need for Mental Health Services

As you have seen, we have a tool kit of therapies that have proven effective. On the other hand, there are overwhelmingly more people who need treatment than those who actually get it (Clay, 2012). Part of the problem is a dearth of service providers, including psychologists, psychiatrists, social workers, and psychiatric nurse practitioners. Another part of the problem is that some 60 million Americans live in rural areas having no easy access to mental health services. But, thanks to the Internet and the telephone, some of these people now can get help through remote "telehealth" sessions (Novotney, 2011; Stambor, 2006; Winerman, 2006c). Using the telehealth approach, psychologists and other professionals can quickly establish a link with their rural clients to answer questions, make referrals, and even provide therapy.

Mindful that these programs still reach only a small number of people who need help, psychologists Alan Kazdin and Stacey Blasé (2011) have issued a call for a complete "reboot" of psychotherapy. They admonish us

to realize that current methods of treatment emphasize one-on-one counseling and psychotherapy—yet, effective as such treatments are, they can never meet the need. What we require, say Kazdin and Blasé, are major new delivery systems and funding for programs that reach out to many more people. These include not only expansion of telehealth programs, but also initiatives aimed at prevention, at surmounting racial, ethnic, and language barriers to treatment, and to clearing mundane obstacles, such as lack of transportation, babysitting, and appropriate insurance. And today, that's the state of the art in psychotherapy.



The "telehealth" approach to therapy brings mental health services to clients in rural areas, where help might not otherwise be available.

## Psychology Matters

## What Sort of Therapy Would You Recommend?

Now that we have looked at both the psychological and biomedical therapies, consider the following situation. A friend tells you about some personal problems he or she is having and requests your help in finding a therapist. Because you are studying psychology, your friend reasons, you might know what kind of treatment would be best.

### How would you respond?

First, you can lend a friendly ear, using the techniques of **active listening**, acceptance, and exploration of alternatives. In fact, this may be all that your troubled friend needs. But if your friend wants to see a therapist or if the situation looks in any way like one that requires professional assistance, you can use your knowledge of mental disorders and therapies to help your friend decide what sort of therapist might be most appropriate. To take some of the burden from your shoulders, both of you should understand that any competent therapist will always refer the client elsewhere if the required therapy lies outside the therapist's area of expertise.

### A Therapy Checklist

Here, then, are some questions you will want to consider before you recommend a particular type of therapist:

- **Is medical treatment needed?** While you should not try to make a diagnosis, you should encourage your friend to see a medical specialist, such as a psychiatrist or nurse practitioner, if you suspect that the problem involves a major mental disorder such as psychosis, mania, or bipolar disorder. Medical evaluation is also indicated if you suspect narcolepsy, sleep apnea, epilepsy, Alzheimer's disease, or other problems recognized to have a biological basis. If your suspicion is confirmed, the treatment may include a combination of drug therapy and psychotherapy.

- **Is there a specific behavior problem?** For example, does your friend want to eliminate a fear of spiders or a fear of flying? Is the problem a rebellious child? A sexual problem? Is she or he depressed—but not psychotic? If so, behavior therapy or cognitive–behavioral therapy with a counseling or clinical psychologist is probably the best bet. (Psychiatrists and other medical practitioners are not usually trained in these procedures.) You can call a prospective therapist's office and ask for information on specific areas of training and specialization.

- **Would group therapy be helpful?** Many people find valuable help and support in a group setting, where they can learn not only from the therapist but also from other group members. Groups can be especially effective in dealing with shyness, lack of assertiveness, and addictions, and with complex problems of interpersonal relationships. (As a bonus, group therapy is often less expensive than individual therapy.) Professionals with training in several disciplines, including psychology, psychiatry, and social work, run therapy groups. Again, your best bet is a therapist who has had special training in this method and about whom you have heard good things from former clients.

- **Is the problem one of stress, confusion, or choice?** Most troubled people don't fall neatly into one of the categories that we have discussed in the previous points. More typically, they need help sorting through the chaos of their lives, finding a pattern, and developing a plan to cope. This is the territory of the insight therapies.

### Some Cautions

We now know enough about human biology, behavior, and mental processes to avoid certain treatments. Here are some particularly important examples:

- **Drug therapies to avoid.** The minor tranquilizers (antianxiety drugs) are too frequently prescribed for patients leading chronically stressful lives. As we have said, because of their addicting and sedating effects, these drugs should only be taken for short periods—if at all. Similarly, some physicians ignore the dangers of sleep-inducing medications for their patients who suffer from insomnia. While these drugs have legitimate uses, many such prescriptions carry the possibility of drug dependence and of interfering with the person's ability to alter the conditions that may have caused the original problem.

- **Advice and interpretations to avoid.** Although psycho-dynamic therapy can be helpful, patients should also be cautioned that some such therapists may give ill-advised counsel in problems of anger management. Traditionally, Freudians have believed that individuals who are prone to angry or violent outbursts harbor deep-seated aggression that needs to be vented. But, as we have seen, research shows that trying to empty one's aggressions through aggressive behavior, such as shouting or punching a pillow, may actually increase the likelihood of later aggressive behavior.

With these cautions in mind, then, your friend can contact several therapists to see which has the combination of skills and manner that offer the best fit for her problem and her personality.

# Key Question: How Do the Psychological Therapies and Biomedical Therapies Compare?

> **Core Concept 13.4**
>
> **While a combination of psychological and medical therapies is often better than either one alone for treating mental disorders, most people who have unspecified "problems in living" are best served by psychological treatment alone.**

*Now that we have looked at both the psychological and medical therapies, can we say which approach is best?*

In this section, we will see that the answer to that question depends on the disorder. But before we look at the treatment choices for several major conditions, we should acknowledge some other influences that cloud the issue of medical versus psychological treatments.

We have seen that psychologists and psychiatrists have long been at odds over the best forms of treatment for mental disorders. In part, the dispute is over territory and money: Who gets to treat people with mental problems—and bill their insurance? The big pharmaceutical companies, with billions of dollars at stake, play a formidable role in this dispute, too. You can glimpse the sort of hardball game Big Pharma plays by noting the advertising for prescription drugs that is directed at the general public. Because of these conflicting interests and pressures, research on medical and psychological therapies has been done largely in parallel, with each side promoting its own approach and ignoring the other's. Unfortunately, this has meant that comparatively little research has focused on the effectiveness of **combination therapies**, involving both medication and psychotherapy used in concert.

That said, let's take a look at how we might weigh the options of medical and psychological treatment in some specific disorders with which you are now familiar. Here's what the core concept for this section suggests:

> While a combination of psychological and medical therapies is often better than either one alone for treating mental disorders, most people who have unspecified "problems in living" are best served by psychological treatment alone.

More specifically, what we will find is that a very large number of people with psychological problems do not have a *DSM-5* disorder but need psychological counseling or therapy to help them work through difficult periods in their lives. On the other hand, many of the well-known *DSM-5* disorders, including the depressive disorders and schizophrenia, are best treated by a combination of medical and psychological therapies. Let's begin with the latter.

By the end of this section, you will be able to:

**13.10**  Compare the effectiveness of psychological and medical treatment for schizophrenia

**13.11**  Compare psychological and medical treatments for depression and the anxiety disorders

**13.12**  Explain who the "worried well" are and how they are often treated in the U.S.

# 13.10: Schizophrenia: Psychological versus Medical Treatment

**Objective:**  Compare the effectiveness of psychological and medical treatment for schizophrenia

Ever since the discovery of antipsychotics more than 50 years ago, these drugs have represented the front line of treatment for **schizophrenia**. There is nothing that "cures" the disorder, but medicines have reduced schizophrenic symptoms and improved the lives of many patients. But it is also obvious that drugs alone are not as effective as drugs combined with various supportive therapies, along with a supportive environment.

Supplemental treatment, in the form of family therapy, social skills training (often in community residential treatment centers), and occupational therapy (through sheltered workshops, such as Goodwill Industries), has brought schizophrenic patients back into contact with their communities. But until recently, conventional psychological therapies were little used. In

the past few years, however, advocates of cognitive–behavioral therapy have attempted to treat schizophrenia, with encouraging results, even with patients who have not responded to medication (McGurk and others, 2007; Rector & Beck, 2001).

# 13.11: Depression and Anxiety Disorders: Psychological versus Medical Treatment

**Objective:** Compare psychological and medical treatments for depression and the anxiety disorders

Fluoxetine (Prozac) is the planet's most widely prescribed drug. Together with other SSRI medications, it represents a $10 billion worldwide industry for the treatment of depression (Bower, 2006b). In addition, antidepressants are often used to treat panic disorder and other conditions marked by anxiety. These drugs may be worth every penny if they are effective in alleviating the suffering of these very common disorders.

*But just how effective are they? And how effective are they in comparison with psychological therapies?*

## 13.11.1: CBT versus Drugs

Studies show that antidepressant drugs and cognitive–behavioral therapy (CBT)—the psychological treatment for which we have the most evidence of efficacy—are equally effective ways of treating depression and panic disorder, at least in the short run. Significantly, however, CBT holds an edge over drug therapy in the long–term—particularly in depression, where the rate of patient relapse for CBT is about *half* that of antidepressant medications (Baker and others, 2008; DeRubeis and others, 2005; Hollon and others, 2002).

**But what happens if depressed patients get antidepressants *and* CBT?** The research shows that they may do even better than with either treatment alone (DeAngelis, 2008a; Keller and others, 2000; Thase and others, 1997). Oddly, combination therapy seems *not* to offer an advantage for those with anxiety disorders.

Advances in understanding the brain now suggest why such a combination therapy approach seems to be effective for depression. Neuroscientist Helen Mayberg has shown that CBT and the antidepressants each work their wonders by affecting different parts of the brain. Antidepressants apparently target the **limbic system**—which contains the brain's main emotion pathways. In

contrast, CBT affects a part the frontal cortex associated with reasoning. The common factor in both approaches is an "alarm switch" that gets turned off, either by the effect of drugs on the "fast" emotion pathway in the limbic system or by the effect of CBT on the brain's "slow" emotional circuitry in the cortex (Goldapple and others, 2004). Thus, as research from the clinic and the lab come together, many clinicians have come to favor a *combination therapy* approach for depression, using both drugs and CBT. In fact, a combined approach would be a reasonable option for Derek's depression (described at the beginning of the chapter). Such a combined drug-and-medicine approach for bipolar patients also has research support (Miklowitz and others, 2007).

## 13.11.2: ECT

And what about electroconvulsive therapy (ECT)? Although clinicians commonly assert that ECT is the most effective treatment for psychotic depression (Hollon and others, 2002), only one study, done in Sweden, has compared ECT head-to-head with antidepressants. The principal finding: Suicide attempts were less common among those patients receiving ECT than among those taking antidepressants (Brådvik & Berglund, 2006). As for transcranial magnetic stimulation, it is too early to tell how useful that will become.

# 13.12: "The Worried Well" and Other Problems: Not Everyone Needs Drugs

**Objective:** Explain who the "worried well" are and how they are often treated in the U.S.

While a combination of psychological therapy and drugs may be best for some disorders, we have seen that drugs are *not* useful for treating specific phobias. Likewise, medication has little value as a therapy for most learning disabilities, psychogenic sexual dysfunctions, most personality disorders, and most developmental disorders (with the exception of ADHD). In addition, we should remember that many people who have psychological problems do not have a diagnosed mental disorder, such as depression, a phobia, or schizophrenia. Rather, they may have financial difficulties, marital problems, stress on the job, out-of-control children—or perhaps they just experience loneliness and feelings of inadequacy: These are the people that clinicians sometimes call "the worried well."

That's not to say that those whose problems don't qualify as an "official" disorder are not suffering. They

struggle with what we might term generic "problems in living." The difficulty is that people with such issues too often persuade a physician to prescribe antidepressants or antianxiety medications. What they really need is a referral to a mental health professional who could help them sort through their problems and choices.

## 13.12.1: Whatever Happened to Derek?

Dr. Sturm and Derek agreed on a weekly series of cognitive–behavioral sessions aimed at curbing his depression. And those sessions were going well when Dr. Sturm read about a connection between depression and sleep apnea, a sleep disorder in which people are usually unaware that they stop breathing for up to a minute, many times a night (Wheaton and others, 2012). Most commonly this happens because the airway collapses as they enter the deeper stages of sleep. Often the only symptoms they report are daytime drowsiness and sleepiness. A sleep study confirmed that Derek had sleep apnea.

Fortunately, there is an effective treatment: He began using a CPAP (continuous positive air pressure) machine to keep his airway open during sleep. The result was a dramatic lifting of his depressive moods—consistent with the results of a recent major study involving the treatment of sleep apnea in depressed patients (Susman, 2012). Nevertheless, Derek plans to continue with cognitive–behavioral therapy, because, as Dr. Sturm says, even if you feel better now, you need to learn how to deal with a life without depression!

## 13.12.2: Early Intervention and Prevention Programs: A Modest Proposal

A recent federal report suggests that the United States could save as much as $247 billion a year by instituting tried-and-true programs that would nip mental health problems of children and adolescents in the bud (Board on Children, Youth, and Families [BCYF], 2009; O'Connell and others, 2010). "The effects of prevention are now quite well documented," says Irwin Sandler, director of the Prevention Research Center at Arizona State University (Clay, 2009, p. 42).

The report recommends identifying young people who are at risk for emotional and behavior disorders and getting early help for them. Such preventive programs include stress management sessions for youth at risk for depression, cognitive–behavioral therapy for children exhibiting excessive anxiety, and parenting skills classes and counseling services for families dealing with adversities such as divorce or poverty. At present, such programs exist on only a small scale. What we need now is research on moving such interventions from the lab into the field, notes Sandler.

But prevention is not just for kids. A number of experimental programs suggest that intervention strategies can help prevent depression in both children and adults (Muñoz and others, 2012). Typically, this means identifying people at risk for depression (e.g., those having a family history of depression or having had previous episodes of depression) and providing educational and "preventive therapy" opportunities.

For adults, it may mean practicing stress-reduction and wellness techniques. Here, we will take special note of the new research showing the value of exercise. Everyone knows, of course, that exercise is a powerful tool in conquering obesity. Yet, clearly, the connection between exercise and mental health hasn't registered in the public mind. Nor is it widely understood among mental health professionals (Weir, 2011). Still, for more than 20 years, evidence has been accumulating that regular exercise works just as well as medication in combating depression, anxiety, and many of the problems-in-living we discussed earlier (Blumenthal and others, 2007; Novotney, 2008; Ströhle, 2009). A few studies even suggest that exercise may help sharpen the mind and fend off dementia (Azar, 2010). Clinical training programs are just starting to take notice of this valuable old tool with a newly discovered use.

---

**Psychology Matters**

## Using Psychology to Learn Psychology

Consider the ways in which psychotherapy is like your educational experiences in college:

- Most therapists, like most professors, are professionals with special training in what they do.
- Most clients are like students in that they are seeking professional help to change their lives in some way.
- Much of what happens in therapy and in the classroom involves learning: new ideas, new behaviors, new insights, and new connections.

### Learning as Therapy

It may help to think of learning psychology in therapeutic terms—much as Peter Lewinsohn uses a teaching/learning model in his therapy for depression. As we have seen, therapy seems to work best when therapist and client have a good working relationship and when the client believes in the value of the experience—and the same is almost certainly true for the student–professor relationship. You can take the initiative in establishing a personal-but-professional relationship with your psychology professor by doing the following two things:

1. Asking questions or otherwise participating in class (at appropriate times and without dominating, of course) and

2. Seeking your instructor's help on points you don't understand or on course-related topics you would like to pursue in more detail (doing so during regular office hours).

The result will be learning more about psychology because you will be taking a more active part in the learning process. Incidentally, an active approach to the course will also help you stand out from the crowd in the professor's mind, which could be helpful if you later need a faculty recommendation for a scholarship or admission to an advanced program.

Now consider a parallel between group therapy and education. In group therapy, patients learn from each other as well as from the therapist. Much the same can occur in your psychology course if you consider other students as learning resources.

## Change Behavior, Not Just Thinking

One other tip for learning psychology we borrow from cognitive–behavioral therapy: the importance of changing behavior as well as thinking. It is easy to "intellectualize" a fact or an idea passively when you read about it or hear about it in class. But you are likely to find that the idea makes little impact on you ("I know I *read* about it, but I can't *remember* it!") if you don't use it.

The remedy is to do something with your new knowledge: Tell someone about it, come up with illustrations from your own experience, or try acting in a different way. For example, after reading about active listening in this chapter, try it the next time you talk to a friend. Educators sometimes speak of this as "active learning."

And, we suggest, it's one of those psychological therapies that works best without drugs!

# Critical Thinking Applied: Evidence-Based Practice

The field of therapy for mental disorders is awash in controversy. Psychologists and psychiatrists dispute the value of drugs versus psychological therapies. Arguments rage over the advantages and disadvantages of electroconvulsive therapy for treating depression. But there is no dispute more acrimonious than the one over *evidence-based practice*, a dispute that is particularly bitter among clinical psychologists (Bower, 2005a).

## What Is the Issue?

Two decades ago, the American Psychological Association established a special task force charged with evaluating the effectiveness of various psychological therapies (Chambless and others, 1996). The thrust of their findings was that literally dozens of specific disorders can be treated successfully by therapies that have been validated in well-designed experiments (Barlow, 1996). Here are a few examples of therapies pronounced effective by the APA task force:

- Behavior therapy for specific phobias, enuresis (bed wetting), autism, and alcoholism
- Cognitive–behavioral therapy for chronic pain, anorexia, bulimia, agoraphobia, and depression
- Insight therapy for couples' relationship problems

More recently, a report by the Association for Psychological Science focused specifically on evidence-based treatments for depression (Hollon and others, 2002). That document asserts that several varieties of psychotherapy can be effective. These include cognitive–behavioral and family therapy. (The APS report also acknowledged that there is a legitimate role for both drug and electroconvulsive therapies in the treatment of depression.) As we have seen, some studies now suggest that, for depression, a combination of cognitive–behavioral therapy and drug therapy can have a greater effect than either treatment alone (Keller and others, 2000).

*So, what's all the fuss about?* At issue is whether counselors and therapists should be *limited* to the use of specific therapy methods known as **empirically supported treatments (EST)**, that is, to treatments that have been validated by research evidence showing that they actually work (Kazdin, 2008; Westen and others, 2005). So how could anyone possibly object to that, you might ask?

Surprisingly, psychologists line up on both sides of this issue (Johnson, 2006). Those in opposition say that the devil is in the details: They say that they are not antiscience, but they believe "empirically supported treatments" is a fuzzy concept (Westen & Bradley, 2005). They also worry about an overly strict interpretation that might inhibit a practitioner's freedom to meet the needs of an individual client. Let's take a critical look at these details.

## What Critical Thinking Questions Should We Ask?

No one doubts that the people on both sides of the evidence-based practice issue are decent and honorable and that among them are genuine experts on therapy. So we won't question their credibility. But it might be a good idea to ask:

What biases does each side have that might make them weigh the options differently?

## The Evidence-based Practice Movement

Those pushing the idea of evidence-based practice point to a long history of misguided and even harmful therapies—from beatings to lobotomies—to which people with mental problems have been subjected. Even in modern times, some practitioners continue to advocate techniques that can potentially harm their clients (Lilienfeld, 2007). These include "scared straight" interventions for juvenile offenders, facilitated communication for autism, recovered-memory therapies, induction of "alter" personalities in cases diagnosed as dissociative identity disorder, DARE (antidrug education) programs in the schools, boot-camp programs for conduct disorder in prisoner populations, sexual reorientation for homosexuality, and catharsis ("get-it-out-of-your-system") treatment for anger disorders. An even longer list (based on a survey of clinical psychologists), ranging from the merely ineffective to the crackpot, would include angel therapy, past lives therapy, treatments for PTSD caused by alien abduction, aromatherapy, therapeutic touch, neurolinguistic programming, primal scream therapy, and handwriting analysis (Norcross and others, 2006).

In 2009, the Association for Psychological Science issued a major report on the current status of clinical psychology (Baker and others, 2008; West, 2009). In that report, the APS blasted clinicians for their failure to use treatments grounded in science, noting that an "alarming number" of clinicians are unaware of empirically validated treatments. The report states:

> Research has shown that numerous psychological interventions are efficacious, effective, and cost-effective. However, these interventions are used infrequently with patients who would benefit from them. (p. 67)

An independent report by clinical researchers R. Kathryn McHugh and David Barlow (2010) concurs, emphasizing the difficulty of moving new treatment methods out of the laboratory and into clinical practice.

## Those Favoring Caution

While acknowledging that we have made great strides in developing highly effective treatments for a number of

disorders, those urging caution point out that we are light-years from having the tools to treat all mental disorders—even with the use of drugs. Consequently, they fear that insurance companies and HMOs will be unwilling to pay for treatments not on the official list or for any deviations from "approved" treatments, no matter what the needs of the individual patient (Cynkar, 2007b). They also worry that the managed-care companies will force therapists into a one-size-fits-all approach that would ignore both the clinician's judgment and the client's complex needs (Shedler, 2006). Because therapy is such a time-consuming process, they also fear that nonmedical therapists will be squeezed out of the picture by drug prescribers who may take only a few minutes with each patient.

Those with reservations about evidence-based practice have several other, more subtle concerns (Westen & Bradley, 2005). For example, they point out that therapy is much more than the application of specific *techniques:* Researchers find that a common element in successful therapy is a caring, hopeful relationship and a new way of looking at oneself and the world (Wampold and others, 2007). This conclusion has been supported by studies that find the effectiveness of therapy to depend less on the *type of therapy* used and more on the *quality of the relationship* (also called the *therapeutic alliance*) between the therapist and client (Wampold & Brown, 2005). Therapy also involves a host of *individual client factors*, such as motivation, intelligence, and the nature of the problem itself. We can represent these three aspects of therapy graphically, as in Figure 13.8.

For some problems (such as a relationship issue or a vocational choice problem—the "problems in living" that we discussed earlier), no specific ESTs exist. Moreover, the specific type of therapy used in such cases may be less important than a supportive therapeutic relationship (DeAngelis, 2005; Martin and others, 2000).

Finally, the critics of evidence-based practice also point out that everyday clinical practice is usually messier than the controlled conditions of research on therapy. For one thing, most clinical patients/clients present themselves with multiple problems, such as an anxiety disorder *and* a

---

**Figure 13.8** Three Aspects of Therapy

Therapy is more than just a set of *techniques*. It also involves a number of *individual variables* involving the therapist and the client, plus the relationship between the client and therapist—the *therapeutic alliance.* All must come together for therapy to be successful.



**Therapeutic Relationship Variables**
• Mutual respect and liking
• Number of therapy sessions
• Understanding
• Etc.

**Individual Variables**
• Nature of the problem(s)
• Client personality traits and temperament
• Client motivation
• Client expectations
• Therapist personality traits and temperament
• Skill of the therapist
• Etc.

**Therapeutic Techniques**
• Cognitive-behavioral therapy
• Psychodynamic therapy
• Humanistic therapy
• Etc.

**Table 13.2**  Summary of the Evidence-Based Practice (EBP) Debate

| Arguments Favoring EBP | Arguments Opposing EBP |
| --- | --- |
| • Some treatments are clearly harmful, and practitioners should not be allowed to use them.<br>• Specific empirically supported therapies (ESTs) have been demonstrated to be effective in dealing with certain disorders.<br>• Psychology is a science, and psychological practitioners should follow what the research shows to be best.<br>• Giving clinical judgment equal weight with science would lead to anarchy, in which clinicians could ignore the evidence and do what they please. | • Empirically supported therapies (ESTs) is a poorly defined, even meaningless, concept.<br>• EBP is a "one-size-fits-all" approach that would limit the flexibility of clinicians to deal with individual clients' problems, particularly those who have multiple problems or who do not fit a *DSM-5* category.<br>• Insurance companies would not pay for therapy that was not on an approved list of empirically validated treatments.<br>• EBP would prevent practitioners from trying new ideas and developing even more effective therapies.<br>• Scientists have not yet validated treatments for many disorders, so under an EBP approach, many people might have to go without treatment.<br>• Evidence suggests that certain common factors (e.g., the therapeutic alliance) are just as important as the specific type of treatment. |

personality disorder. Yet, most ESTs have been validated on "pure" samples of people having only one specific diagnosis (DeAngelis, 2010; Kazdin, 2008). Rarely do researchers target the largest population in most clinical practices: individuals with multiple "problems in living," such as marital difficulties *and* financial woes *and* child-rearing issues *and* low self-esteem. Moreover, most research aimed at validating therapeutic techniques is severely restricted to just a few sessions—usually no more than a dozen—after which most patients still have some residual problems.

## What Conclusions Can We Draw?

Both sides make good points (see Table 13.2). On the one hand, practitioners should favor empirically validated treatments when they are clearly appropriate and effective. And they certainly should avoid treatments that are ineffective or harmful. But who is going to make that determination: the individual practitioners, the insurance companies, legislators, or professional organizations? Your authors think that the professional psychology associations, such as the APA, must take stands against putting the therapist in a straitjacket by limiting him or her to a list of treatments and disorders for which those treatments may be applied.

In fact, the American Psychological Association has a proposed policy under consideration (APA Presidential Task Force, 2006). The policy would define *evidence-based practice in psychology* as "the integration of the best available research with clinical expertise in the context of patient characteristics, culture, and preferences." Who wouldn't agree with that? Many people, it turns out. In particular, the evidence-based practice advocates are concerned that "clinical expertise" could trump "research," with the result that clinicians could ignore the science and do as they please (Stuart & Lilienfeld, 2007). It is a knotty issue that doesn't lend itself to easy answers.

*Is there a solution in sight?* A partial solution may lie in a proposal made by David Barlow (2004), who suggested

that psychologists make a distinction between *psychological treatments* and what he calls "generic psychotherapy." The empirically validated therapies for specific *DSM-5* disorders would fall under the heading of *psychological treatments*, while reserving the term *psychotherapy* for work with the huge "Other Conditions" *DSM-5* category, including educational, occupational, and marital problems, sexual abuse, and antisocial personality disorder, which together make up a large proportion of the caseloads of many counselors and clinicians. Barlow's proposal would, at least, shrink the disputed territory.

To end this discussion on a more encouraging note: A recent study of 200 practitioners found that they all tended to modify their approach to treatment to fit the needs of their clients as the situation unfolds during counseling or psychotherapy (Holloway, 2003); that is, despite our emphasis in this chapter on conflicting methods for the treatment of psychological disorders, most practitioners are quite willing to adapt their methods to the individual client rather than holding rigidly to a particular theoretical orientation. And that is good news, indeed, coming from a field that has traditionally had strongly divided allegiances. It appears that the emphasis on science-based practice is finally breaking down the old therapeutic boundaries.

## WRITING PROMPT

**The "Worried Well"**

Describe the group that clinicians call the "worried well." Give examples of some of the problems that bring them to therapy.

▶ The response entered here will appear in the performance dashboard and can be viewed by your instructor.

Submit

# Summary: Therapies for Psychological Disorders

## Chapter Problem

What is the best treatment for Derek's depression: psychological therapy, drug therapy, or both? More broadly, the problem is this: How do we decide among the available therapies for any of the mental disorders?

- The most basic choice is between one of the psychological therapies and a biological therapy—or a combination.
- Psychologists or other nonmedical practitioners opt for a psychological therapy when they believe the problem is learned or involves faulty cognitions, behaviors, or relationships.
- The psychological therapies can be further divided into the insight therapies and behavior therapies—or combined approaches known as cognitive–behavioral therapy and social learning. The specific therapy type depends primarily on the therapist's training and orientation.
- Biological therapies are delivered by psychiatrists and nurse practitioners when they believe the problem can best be treated by altering brain function through drugs or other biological interventions.

## What Is Therapy?

### Core Concept 13.1

**Therapy for psychological disorders takes a variety of forms, but all involve a therapeutic relationship focused on improving a person's mental, behavioral, or social functioning.**

People seek **therapy** for a variety of problems, including *DSM-5* disorders and problems of everyday living. Treatment comes in many forms, both psychological and biomedical, but most involve diagnosing the problem, finding the source of the problem, making a prognosis, and carrying out treatment. In earlier times, treatments for those with mental problems were usually harsh and dehumanizing, often based on the assumption of demonic possession. Only recently have people with emotional problems been treated as individuals with "illnesses," which has led to more humane treatment.

Currently in the United States, there are two main approaches to therapy: the **psychological therapy** and the **biomedical therapy** approaches. Other cultures often have different ways of understanding and treating mental disorders, often making use of the family and community. In the United States, there is a trend toward increasing use of **paraprofessionals** as mental health care providers, and the literature generally supports their effectiveness.

## How Do Psychologists Treat Psychological Disorders?

### Core Concept 13.2

**Psychologists employ two main forms of treatment, the insight therapies (focused on developing understanding of oneself and of the problem) and the behavior therapies (focused on changing behavior through conditioning).**

**Psychoanalysis**, the first of the **insight therapies**, grew out of Sigmund Freud's theory of personality. Using such techniques as free association and dream interpretation, its goal is to bring repressed material out of the unconscious into consciousness, where it can be interpreted and neutralized, particularly in the **analysis of transference**. **Neo-Freudian psychodynamic therapies** typically emphasize the patient's current social situation, interpersonal relationships, and self-concept.

Among other insight therapies, **humanistic therapy** focuses on individuals becoming more fully self-actualized. In one form, **client-centered therapy**, practitioners strive to be *nondirective* in helping their clients establish a positive self-image.

Another form of insight therapy, **cognitive therapy**, concentrates on changing negative or irrational thought patterns about oneself and one's social relationships. The client must learn more constructive thought patterns and learn to apply the new technique to other situations. This has been particularly effective for depression.

**Group therapy** can take many approaches. **Self-help support groups**, such as AA, serve millions, even though they are not usually run by professional therapists. Family therapy and couples therapy usually concentrate on situational difficulties and interpersonal dynamics as a total system in need of improvement rather than on internal motives.

The **behavior therapies** apply the principles of learning—especially operant and classical conditioning—to problem behaviors. Among the classical conditioning techniques, **systematic desensitization** and **exposure therapy** are commonly employed to treat fears. **Aversion therapy** may also be used for eliminating unwanted responses. Operant techniques include **contingency management**, which especially involves positive reinforcement and extinction strategies. And, on a larger scale, behavior

therapy may be used to treat or manage groups in the form of a **token economy**. **Participant modeling**, based on research in observational learning, may make use of both classical and operant principles, involving the use of models and social skills training to help individuals practice and gain confidence about their abilities.

In recent years, a synthesis of cognitive and behavioral therapies has emerged, combining the techniques of insight therapy with methods based on behavioral learning theory. **Rational–emotive behavior therapy** helps clients recognize that their irrational beliefs about themselves interfere with life and helps them learn how to change those thought patterns. **Positive psychotherapy (PPT)** is a similar approach coming out of the positive psychology movement. Brain scans suggest that **cognitive–behavioral therapy** produces physical changes in brain functioning.

The effectiveness of therapy was challenged in the 1950s by Eysenck. Since that time, however, research has shown that psychotherapy can be effective for a variety of psychological problems. Often, it is more effective than drug therapy. As the research on mental disorders becomes more refined, we are learning to match specific psychotherapies to specific disorders.

Most people do not get psychological help from professionals. Rather, they get help from teachers, friends, clergy, and others in their community who seem sympathetic. Friends can often help through **active listening**, acceptance, and exploration of alternatives, but serious problems require professional assistance.

## How Is the Biomedical Approach Used to Treat Psychological Disorders?

### Core Concept 13.3

**Biomedical therapies seek to treat psychological disorders by changing the brain's chemistry with drugs, its circuitry with surgery, or its patterns of activity with pulses of electricity or powerful magnetic fields.**

Biomedical therapies concentrate on changing the physiological aspects of mental illness. Drug therapy includes **antipsychotic**, **antidepressant**, mood stabilizing, **antianxiety**, and **stimulant drugs**. Most affect the function of neurotransmitters. Such drugs have caused a revolution in the medical treatment of mental disorders such as schizophrenia, depression, bipolar disorder, anxiety disorders, and ADHD. Critics, however, warn of their abuse, particularly in treating the ordinary stress of daily living.

**Psychosurgery** is rarely done anymore because of its radical, irreversible side effects. **Electroconvulsive therapy**, however, is still widely used—primarily with depressed patients—although it, too, remains controversial. A new and potentially less harmful alternative involves **transcranial magnetic stimulation** of specific brain areas. Meanwhile, hospitalization has been a mainstay of medical treatment, although the trend is away from mental hospitals to community-based treatment. The policy of **deinstitutionalization** was based on the best intentions, but many mental patients have been turned back into their communities with few resources and little treatment. When the resources are available, however, community treatment is often successful.

If someone asks your advice on finding a therapist, you can refer him or her to any competent mental health professional. While you should avoid trying to make a diagnosis or attempting therapy for mental disorders, you may use your knowledge of psychology to steer the person toward a medical specialist, a behavior therapist, group therapy, or some other psychological treatment that you believe might be appropriate. There are, however, some specific therapies and therapeutic techniques to avoid.

## How Do the Psychological Therapies and Biomedical Therapies Compare?

### Core Concept 13.4

**While a combination of psychological and medical therapies is often better than either one alone for treating mental disorders, most people who have unspecified "problems in living" are best served by psychological treatment alone.**

Both medical and biological therapies can point to their successes, but until recently, few studies have compared medical and psychological therapies directly. New studies show that for depression, a **combination therapy**, consisting of CBT and medication, is often best. Comparative data for ECT and the new transcranial magnetic stimulation are sparse. As for the anxiety disorders, some studies have shown a combination of drugs and CBT to be effective. A clear exception involves the specific phobias, for which behavioral therapy is superior to drug therapy—which may actually aggravate the problem. For schizophrenia, medications are the front line of treatment, although they do not cure the disorder. Until recently, conventional psychotherapies were not often used with schizophrenia, but new research suggests that combination therapy may be effective.

Medication is not useful for treating many psychological problems, such as learning disabilities, many sexual dysfunctions, most personality disorders, and most developmental disorders. In addition, most people who have psychological problems do not have a *DSM-5* disorder but rather suffer from "problems in living."

Education and psychotherapy have many points in common. In particular, both involve learning and the ultimate goal of changes in behavior. The authors suggest that both education and psychotherapy are more likely to be successful when the client takes an active role.

## Critical Thinking Applied: Evidence-Based Practice

Psychological therapists are divided on the question of evidence-based practice (EBP) and empirically supported treatments (ESTs). Opponents say that ESTs are not clearly defined, suppress innovative new treatments, offer no help in treating clients with multiple disorders, and deemphasize the importance of the therapeutic alliance. Proponents, however, counter that some treatments are clearly harmful and should be prohibited. They acknowledge that ESTs have not been found for all disorders. However, therapists as good scientists should be willing to practice those treatments for which science has found support.

# Chapter 14
# From Stress to Health and Well-Being



Father Mychal Judge, Chaplain of the Fire Department of New York, is carried out of the 9/11 rubble after being killed while performing last rites for a fallen comrade.

## ⌄ Core Concepts

**14.1** Traumatic events, chronic lifestyle conditions, major life changes, and even minor hassles can all cause a stress response.

**14.2** The physical stress response begins with arousal, which stimulates a series of physiological responses that in the short term are adaptive but that can turn harmful if prolonged.

**14.3** Personality characteristics affect our individual responses to stressful situations and, consequently, the degree to which we are distressed when exposed to potential stressors.

**14.4** Effective coping strategies reduce the negative impact of stress on our health, while positive lifestyle choices can enhance our mental and physical health as well as our overall well-being.

On September 11, 2001, at 8:46 A.M., retired firefighter Dennis Smith sat outside a New York clinic, waiting for his annual physical, when a nurse rushed in and announced that a plane had just crashed into the North Tower of the World Trade Center in lower Manhattan (Smith, 2003b). The engine and ladder companies of New York's fire department (FDNY) were already responding to the alarms—trucks racing to the scene and firefighters running into the same buildings from which hordes of people desperately sought to escape. Smith asked himself what conditions his co-workers were facing: the heat of the fire, the best access to the buildings, the stairwells' integrity. How many were already trapped inside and facing death?

One firefighter later described the chaos: "It looked like a movie scene, where the monster was coming . . . [W]e got showered with debris. . . . Things were hitting—bing, bang,

boom—over your head" (Smith, 2003b, pp. 70–71). He had climbed high into the North Tower when the South Tower was hit [by a second plane] and "suddenly, there was this loud, loud noise overhead." He recalled huddling inside a stairwell, inventorying his resources: "I was thinking of my situation—what should I do, what can I do? What do I have that is positive? What tools do I have? . . . The main thing I had was my helmet. I remember thinking how important it was to have had that helmet" (p. 75).

But the critical need for the helmet was forgotten in one ironic moment by Smith's fellow firefighter, Father Mychal Judge. The FDNY chaplain was among the first to arrive and, after hearing that firefighters were trapped inside, he rushed into the smoke. While performing last rites, he removed his helmet out of respectful habit—just as a shower of debris fell, killing him instantly (Downey, 2004).

## Stress in the Aftermath

In the weeks and months after the terrorist attacks, firefighters continued to search for bodies. They buried, memorialized, and mourned their brothers and sisters. Few of the 343 missing were ever recovered. Those who had made it—while others died just a few feet away from them—endured survivor's guilt, ambivalent and uncertain why they deserved to live, asking themselves, "Why me?" Some developed symptoms of posttraumatic stress disorder (PTSD), reliving the terrifying moments of the disaster again and again. And the aftereffects of that day weren't limited to those individuals personally involved: Millions of people around the world remained glued to their televisions for days, repeatedly watching the towers as they fell and hearing firsthand accounts from survivors. (We will note later how our media is often a source of mediated stress.)

The surviving firefighters continued to grieve. Many of them rejected false reverence or gloom in remembering their friends, preferring instead to laugh and joke about their fallen comrades' quirks and screw-ups. Manhattan's Engine 40/Ladder 35 lost 12 firefighters, more than any other firehouse and, like everyone else, wondered what really happened to the missing victims. Then, 5 months after 9/11, the members of 40/35 learned of a news tape that appeared to show their 12 lost partners entering the tower minutes before it collapsed on them. The video had been shot at a distance, but the moving figures gradually became recognizable. Staring intently at the screen, the surviving firefighters gazed once more on friends who had not returned. They played the video over and over again (Halberstam, 2002).

Firefighters are different from most other public servants because they spend much of their time in a shared communal house, their firehouse. Because fires and other emergencies are relatively rare, they spend lots of down time just hanging out with each other, playing cards and other games, as well as reading and watching TV. In most houses, a family sense evolves. With this in mind, you can better appreciate the stressful impact on any of them from the sudden deaths of so many of their everyday families. In addition, each felt obligated to attend as many memorial services as possible, not only for their fallen house members but for all those they knew in recruit training or from other houses where they had served or had extended-family relatives working. For some, attending heart-wrenching memorial services was an enduring tribulation lasting more than a year—and also an unending source of secondary distress.

> **CHAPTER PROBLEM: Were the reactions and experiences of the 9/11 firefighters and others at the World Trade Center attacks typical of people in other stressful situations? And what factors explain individual differences in our physical and psychological responses to stress?**

Of course, running into a falling building is not a typical human response; rather, it is a learned response of trained rescue workers. But what about the survivor's guilt and subsequent delayed stress reactions from repeated viewing of the disaster on websites and televisions around the world—are these "normal" stress responses? What connections can we make between these reactions and our own personal reactions to stress? In considering these questions, several related issues emerge:



A fast-paced culture, such as this one, creates environmental stressors unique to modern society.

- Stress isn't limited to major tragedies, traumas, and disasters. All of us encounter potentially stressful situations in our everyday lives—at our jobs, in our relationships, at school, in traffic, or as a result of illness. But have you ever noticed that some people seem to get "stressed out" at even minor annoyances, while others appear calm, cool, and collected even in a crisis situation? In addition, some people bounce back quickly after



Cultures that enjoy a slower pace of life do not face the same type of stressors experienced by city dwellers.

major stress, while others have trouble regaining their equilibrium. How can we explain these individual differences in our reactions to the same sources of stress?

- We must also consider how our stressors have changed in recent centuries, and how our stress responses evolved across the millennia of our species to aid our survival. Many cultures today live much faster-paced lives than those of previous generations. How are the stresses we face today different from those of our ancient ancestors? What impact might the differences in our living environments have on the effectiveness of our stress response?

# The Multiple Perspectives Applied to Stress

Multiple perspectives are necessary to understand our human response to stress. What goes on in the body and the brain that can influence our reactions to stressful situations? And how are these physiological responses mediated by our thought processes, our prior learning, our personality, our particular stage in life, and the social context in which stress occurs (see Figure 14.1)?

**Figure 14.1**  The Multiple Perspectives Applied to Stress



**Biological Perspective:**
Are some individuals just "hard-wired" in a way that makes them better able to cope with stress?

**Behavioral Perspective:**
Can certain stress responses — effective or ineffective — be learned?

**Developmental Perspective:**
Do older people deal with stress more or less effectively than younger people?

**Cognitive Perspective:**
Do some individuals perceive stress differently than others?

**Whole-Person Perspective:**
Do certain personality traits predict healthier coping?

Psychodynamic View

Humanistic View

Trait and Temperament View

**Sociocultural Perspective:**
Are certain stress responses more prevalent in some cultures than in others?

**STRESS**

Explore through the interactivity in the figure. Can you think of some examples of each perspective? Select the pop tips to compare your thoughts and read few examples of the many ways that multiple perspectives are necessary to understand the complex nature of stress."

Finally, to what extent do we have control over our own reactions to stress and to the potential toll that stress is taking on our physical and mental health? The good news is that we are not "stuck" with our current stress level; there are specific changes we can make to help us meet the challenges of stress more effectively. Thus, we conclude this chapter on a more positive note by not only describing effective coping strategies but also introducing you to a new health psychology perspective that is promoting well-being, resilience, and happiness. In addition, we will illustrate that the most important commitment you should make to be healthy mentally and physically is to exercise regularly. Understanding the hows and whys of stress and best practices in dealing with stress can improve the quality of your life.

As we explore these questions, keep in mind the stresses you have faced in the past and the ones you deal with currently. Then consider how the wealth of information we are sharing with you in this chapter can help you to first understand the sources of stress in your life—and then to improve the way you perceive and manage that stress. Although it would seem that college students' lives are less stressful than those of firefighters and other first responders, the recent increase in college students' visits to mental health facilities and their increasing rates of suicide force us to examine where all this academic stress is coming from, and how *you* can better deal with it.

# Key Question: What Causes Distress?

**Core Concept 14.1**

**Traumatic events, chronic lifestyle conditions, major life changes, and even minor hassles can all cause a stress response.**

What images come to mind when you hear the word **stress**? Most people think of the pressures in their lives: difficult jobs, unhappy relationships, financial woes, health problems, and—for students—final exams. You may have some visceral associations with stress, too: a churning stomach, perspiration, headache, or tension in your neck or upper back. We use the word *stress* loosely in everyday conversation, sometimes referring to a situation that confronts us (Lazarus and others, 1985). For example, if your employer or professor has been giving you a difficult time, you may say that you are "under stress," as

though a heavy object were squashing you. You may also say you are "feeling stress" as a result. Thus, in everyday conversation, we use the word *stress* to refer both to an external threat and to our physical and mental response we feel when exposed to it.

Psychologists, however, make a distinction between the outer pressure or event that causes stress and its inner impact on us as individuals. **Stressors** are the external events that cause internal stress responses. The subsequent impact we experience—biologically, psychologically, and/or emotionally—is called *stress* (Krantz and others, 1985). We will use the term **distress** to refer to our stress responses that are negative in valence. Distress, then, is a negative cognitive interpretation of a potentially harmful biological response.

Thus, a stressor is the sight of a police officer climbing out of her car after you ran through a stop sign while texting. Your stress response to that sight of the cop about to ticket you—your racing heart, shaky hands, and sudden perspiration—are signs of the biological changes induced by this stressor. Your psychological stress—in this case, your distress—is the complex mix of shame, sense of stupidity, and worry about losing your license for this third moving violation if you cannot plead your way out of this unfortunate situation.

What are the common stressors faced by humans today? We begin this chapter with a review of stressors found to have the most impact on us. These include everything from petty daily hassles to relationship problems with family, friends, and romantic partners to terrorist attacks, as noted in the core concept for this section:

> Traumatic events, chronic lifestyle conditions, major life changes, and even minor hassles can all cause a stress response.

Stress is a type of emotional response—consequently, interpretation or **cognitive appraisal** plays an important role in the degree of stress we feel when faced with a stressor. For example, some track athletes interpret the arousal they are feeling when they are in the starting blocks awaiting the Go gun as nervousness, while others interpret it as excitement. Do you think that might make a difference in who is more likely to win that race? In our earlier example of getting pulled over for running a stop sign, a person who had never before received a driving ticket may interpret that situation as less stressful (and thus feel less distress) than one who had several recent tickets and was at risk for losing his driver's license or paying higher insurance rates. Cognitive appraisal accounts for some individual differences in how people respond to stressors as well as in how effectively we succeed in dealing with them. With that in mind, let's look at some of the most powerful stressors we humans face in our lives.

By the end of this section, you will be able to:

**14.1** Examine natural and human-made catastrophes, personal loss, and posttraumatic stress as causes of traumatic stress

**14.2** Describe five different chronic stressors

# 14.1: Traumatic Stressors

**Objective:** Examine natural and human-made catastrophes, personal loss, and posttraumatic stress as causes of traumatic stress

Catastrophic events, such as natural disasters and terrorist attacks, qualify as **traumatic stressors**. On a more personal level, a sudden major life change, such as the loss of a loved one, constitutes a traumatic stressor as well—despite the fact that death and separation are likely to affect everyone at some time. We will examine traumatic stress by first considering natural and human-made catastrophes, then personal loss, and finally posttraumatic stress.

## 14.1.1: Catastrophe

In May 2008, shortly before the Olympics in Beijing, a massive earthquake in China killed more than 67,000 people. Subsequent quakes in Haiti and Chile also had devastating consequences on the population for many months after— as did the 2011 earthquake, tsunami, and resulting breach of nuclear reactors in Japan. Natural disasters such as these, as well as human-made tragedies like terrorist attacks and warfare, comprise the category of traumatic stressors known as **catastrophic events**. These sudden, violent calamities are inevitably accompanied by extreme stress and loss of loved ones or life possessions. Moreover, the psychological and biological consequences can last far longer than the original event, as in the weeks after 9/11 when firefighters and emergency workers sometimes found themselves reliving the events in nightmares and in daytime flashbacks.

Studies of catastrophe survivors provide some insight into the ways individuals respond to these ordeals (Asarnow and others, 1999; Sprang, 1999). It's worth noting here that research of this type is difficult. Obviously, ethical considerations prevent psychologists from creating even minor traumatic events to study their effects on volunteer subjects. Instead, field researchers must wait for a catastrophe to occur and then get to the scene immediately to hear the stories of survivors and observe survivor reactions in the immediate aftermath.

**A NATURAL LABORATORY FOR DISASTER** One opportunity to understand disaster response presented itself in San Francisco in 1989, just as the baseball World Series between the San Francisco Giants and their cross-Bay rivals in the American league, the Oakland A's was about to begin. Spectators (including your senior author) were settling into their seats when the entire stadium began to shake violently. The lights went out, and the scoreboard turned black as a major earthquake struck. Elsewhere in the city, fires erupted, a bridge collapsed, highways were crushed—and people were dying.

One week after the quake, a team of research psychologists began a series of follow-up surveys with about 800 regional residents. Survey responses revealed a clear pattern: The lives of respondents who experienced the earthquake continued to revolve heavily around the disaster for about a month. After this period, they ceased obsessing, thinking, and talking about the quake, but simultaneously reported an increase in other stress-related symptoms including sleep disruption, relationship problems, and nightmares (Wood and others, 1992). Although most symptoms diminished gradually, 1 year later, as many as 20% of residents remained measurably distressed (Pennebaker & Harber, 1991).

In contrast to natural disasters, human-made catastrophes such as crime and terrorism have an added dimension of threat because other people produce them intentionally. **Terrorism** has been defined as a type of disaster caused by "human malevolence" with the goal of disrupting society by creating fear and danger (Hall and others, 2002). Like survivors of natural disasters, terrorism survivors report elevated symptoms of distress that substantially subside after several months (Galea and others, 2003). What appears to be different about surviving a terror attack, however, is the long-term change in perception of threat. Studies of individuals affected—both directly and indirectly—by the 9/11 attacks in America, or by the 2005 bombings at the underground train station in London, found that 50% to 75% of the public continued to worry about the safety of themselves and their families for a year or more following the attack (Rubin and others, 2005; Torabi & Seo, 2004; Weissman and others, 2005).

**PSYCHOLOGICAL RESPONSE TO CATASTROPHE** Psychological responses to natural and human-caused disasters have been theorized to occur in a sequence of stages, as victims experience shock, feel intense emotion, and struggle to reorganize their lives (Beigel & Berren, 1985; Horowitz, 1997). Cohen and Ahearn (1980) identified five stages survivors typically pass through:

1. Immediately after the event, victims experience *psychic numbness*, including shock and confusion, and for moments to days cannot fully comprehend what has happened. Severe, sudden, and violent disasters violate our basic expectations about how the world is supposed to function. For some of us, the unimaginable becomes a stark reality.

2. During a phase of *automatic action*, victims have little awareness of their own experiences and later show poor recall for many details about what occurred. It is a time of acting without much reasoning—following routines, rather than well-planned actions.

3. In the *communal effort stage*, people pool resources and collaborate, proud of their accomplishments but also weary and aware they are using up precious energy reserves. Typically people call or text family, neighbors, and co-workers about how they are doing and help needed.

4. Next, survivors may experience a *letdown* as, depleted of energy, they comprehend and feel the tragedy's impact. Public interest and media attention fade, and survivors feel abandoned, although the state of emergency may continue.

5. An extended period of *recovery* follows as survivors adapt to changes created by the disaster. The fabric of the community changes as the natural and business environments are altered.

This sequence of reactions over time are typical response stages to a catastrophic event. **Stage theories** emphasize distinctive changes that occur as one develops or progresses through a life stage or event. Keep in mind, however, that the order of the stages, and even the complete set of stages itself, may not necessarily apply to the entire population—instead, the theory as a whole attempts to summarize commonalities among a range of individual experiences. In this instance, stage theories of stress response are useful for organizing individual accounts into aggregate summaries and also because they help us anticipate what future survivors may go through and what kinds of assistance they may need, so there can be better preparedness programs.

Research also indicates the importance of stories or **narratives** in working through catastrophic experiences. To learn from and make sense of catastrophic loss, we formulate accounts that describe what happened and why. We are especially likely to develop narratives when an event is surprising or unpleasant (Holtzworth-Munroe & Jacobson, 1985) or violates our basic expectations (Zimbardo, 1999). Narratives help us find deeper meaning in loss, which in turn facilitates healing.

**TRAUMA IN THE MEDIA** Catastrophic events merit extended news coverage, and in this Internet age, the sounds and images of others' pain are broadcast and viewed repeatedly. Viewers are not immune to such programs and may experience a sort of "secondhand" traumatization.

Students like you reported repeated viewing of the WTC towers collapsing on 9/11. Recall that, in our opening story, surviving members of the Manhattan firefighters' crew repeatedly viewed a videotape showing their now-dead comrades rushing into the World Trade Center just before the building collapsed. At last they knew for certain the fate of their friends. But was repeated viewing really therapeutic for them? Conventional wisdom suggests that identifying the figures on the tape as their friends might give them some closure, and their friends' heroism could help them find meaning in tragedy, but once that goal is achieved, how can repeated viewing be anything but stress enhancing?

Research clearly shows that revisiting and reliving catastrophe causes its own stress. **Vicarious traumatization** is severe stress caused when one is exposed to others' accounts of trauma and the observer becomes captivated by it (McCann & Pearlman, 1990). Whether it be plane crashes, riots in a far-off country, or natural disasters, what matters is the amount of exposure: Schuster and colleagues (2001) found that the more hours viewers spent watching television coverage of the 9/11 attacks, the more likely they were to report stress symptoms later. What's more, a whopping 90% of respondents all over the country—even those with no personal or job connection to New York or the other sites of the attack—reported experiencing at least one symptom of stress in the aftermath of the attack. By reliving the disaster, heavy viewers of media coverage, including those who lived safely distant from the actual disaster site, nonetheless became psychologically engaged with the victims' suffering and experienced measurable stress as a result.



Despite the horrific nature of the multiple terror attacks of 9/11, it is important to also remember the many acts of heroism. Passengers on United Flight 93, for example, banded together to attack the hijacker piloting their plane.



As a result of the passengers' bravery as they faced certain death, their plane crashed into a deserted Pennsylvania field instead of Washington D.C., thereby saving an untold number of lives. Their heroic actions were chronicled in both a feature film and a documentary.

In spite of what we know about vicarious traumatization, one of the most widely mandated techniques for first responder stress reduction in police, fire, and military units is known as critical incident stress debriefing (CISD). Small groups of those affected by the disaster are essentially forced to share their horror stories, listening to others and telling their own tales of woe. Can you reflect on why such a process might backfire and *increase* rather than ameliorate distress?

**CULTURAL VARIATIONS IN RESPONSE TO CATASTROPHES**   The March 2011 disasters that befell Japan were the worst since its devastation in World War II from atomic bombing. It became a worst-case scenario of incredible proportions. Initially, the earthquake that triggered a 33-foot tidal wave wiped out entire villages, killing thousands and leaving many homeless and without food in the winter cold. Then, radiation exposure from the meltdown of nuclear power plants posed long-term threats of widespread cancer among Japanese residents. Yet, despite these catastrophic experiences, the general response by most Japanese was a communal sense of calm, civility, and moral courage. Veteran reporters on the scene expressed amazement at the way in which Japanese people showed decorum and fought chaos with orderliness. There was no evidence of looting, and no increase in crime. Indeed, in 10-hour-long traffic jams caused by wrecked highways, not a single instance of honking was reported!

The collectivistic cultural focus on politeness, group consensus, and concern for others led to sharing, without complaint, peoples' meager food supplies with strangers. Experts on Japanese culture trace such behaviors to the spiritual strength found in critical, comforting rituals of their religion. Most Japanese are Buddhists or follow ancient Shinto beliefs. Fundamental to these belief systems is alleviating mental and physical suffering through practicing compassion and acceptance of death as the end part of the life process. Buddhism as now practiced is less about spirits of the natural world and more about rituals of society, family, and state, according to Japanese religious scholar Duncan Williams (Grossman, 2011).

## 14.1.2:  Personal Loss

Like many other species, humans are social creatures: We depend on each other for survival. The loss of a loved one is very distressing, even if it is anticipated (such as after a long illness). A sudden, unexpected loss is traumatic: In a rated listing of life changes at the end of this section, you will see "death of spouse" is the most stressful of all life changes (Holmes & Rahe, 1967; Scully and others, 2000). **Grief** is the emotional response to interpersonal loss, a painful complex of feelings including sadness, anger, helplessness, guilt, and despair (Raphael, 1984). Whether grieving the death of a loved one, the breakup of a romantic

relationship, or a betrayal by a trusted friend, you experience the jolt of separation and loneliness and have difficult questions to ponder. Some of our core assumptions about life may be challenged, and we may be forced to adapt to a different reality (Parkes, 2001). As a result, our identities and future plans may be permanently altered (Davis and others, 1998; Janoff-Bulman, 1992).

Psychologists view grieving as a normal, healthy process of adapting to a major life change, with no "right" method or "normal" time period (Gilbert, 1996; Neimeyer, 1995, 1999). Some experts recommend achieving closure, a Gestalt term for perceiving an incomplete stimulus as complete. But psychologists with expertise in grief counseling oppose the goal of closing off the pain and memories of loss. Instead, they recommend **integration**. To understand this, think for a moment about someone you have lost: Perhaps you have "gotten over it" and don't think about it much anymore—yet it remains in your memory, with images, emotions, and thoughts still vivid and accessible and still part of who you are (Harvey, 1996; Harvey and others, 1990). Thus, the final phase of grieving is more accurately thought of as an ongoing process of integration in which each life loss becomes a part of the self-narrative and part of your memory storehouse of meaningful events, both negative and positive (Murray, 2002). See Figure 14.2 to better understand the phases of this process.

The mourning process also requires you to interact socially at a time when you feel especially vulnerable and socially withdrawn. Ironically, friends offering help or sympathy sometimes add to the stress. Hollander (2004) writes of losing first her husband and then, a few months later, her mother. "Am I all right? Everyone seems to be asking me that. . . . Often I find I don't know how to respond to the question" (pp. 201–202). Her friends feel uncomfortable when she weeps openly, and they encourage her to cheer up, to be herself again. Hollander concludes that her pain cannot and must not be rushed: "Closure is not my goal. . . . I am all right exactly because I weep" (p. 204).

**DISENFRANCHISED GRIEF**   When others minimize your loss and fail to sympathize, grief can be especially stressful. Experiences such as death, divorce, and trauma are recognized with formal condolences, such as funerals, hospital visits, sentimental greeting cards, and professional attention from undertakers, attorneys, and physicians (Lensing, 2001). But other painful losses with no official "status" may be ignored or dismissed by the community. For example, women who grieve after a miscarriage, young adults whose close friends have moved far away, and children saddened by the death of a favorite TV or movie star may find themselves alone in their sorrow, getting little sympathy or understanding from others. Their **disenfranchised grief**, the emotion surrounding a loss that others do not understand, cannot be mourned through

**Figure 14.2** The Kübler Ross Change Curve

This figure, based on Elisabeth Kübler Ross's original work on the stages of grief and loss, provides a useful framework for understanding the phases we go through in adapting to a meaningful loss and integrating those experiences into one's self-functioning.



public rituals like memorials or funerals. Fearing others' negative reactions, even behind your back, disenfranchised grievers may try to hide their sorrow—but continue to suffer (Doka, 1989, 1995; Rickgarn, 1996).

Confiding in others can help people cope with loss and trauma (Harvey, 1996; Pennebaker, 1990). During these times, keep in mind the role of professional counselors or psychotherapists, who might be counted on to take your grief seriously. Also, it is therapeutically worthwhile to "confide" in other ways, such as by keeping a written private journal of your feelings and what triggers them over time.

**HUMILIATION AS LOSS**  Which would be more stressful: losing your romantic partner when he or she dies, or having that person leave you for another lover? Both tragedies involve losing your partner. However, losing your partner to another lover can also evoke experiences of shame and humiliation. One study interviewed thousands of adults and categorized their experiences of interpersonal loss, as well as other life-event stressors. The study also assessed individuals' symptoms of anxiety and major depression. Results indicated that rejected respondents were more likely to develop depression than those whose partners had died (Kendler and others, 2003). In discussing their findings, researchers observed that the death of one's partner is a "pure loss event," which does not represent a potential failure or deficiency on the part of the grieving person. In contrast, being left by your spouse or romantic partner "raises issues . . . [such] as humiliation, which is usually seen as the loss of status, the loss of a

sense of self-esteem and the loss of a sense of your own worth" (National Public Radio, 2003a).

In a more recent study, researchers examined how quickly people became depressed following different types of stress. Life events were categorized by whether they involved **targeted rejection**, defined as the "exclusive, active, and intentional social rejection of an individual by others." Results revealed that people who experienced a recent targeted rejection life event became depressed three times faster than those who experienced other types of stress (Slavich and others, 2009). Interestingly, these effects were similar regardless of whether the targeted rejection occurred at work (for example, the person was fired) or in the context of a personal relationship (such as a breakup). In a follow-up study, the increased risk of depression was particularly strong in individuals who had a **genotype** that made them especially sensitive to pain (Slavich and others, 2014). In sum, then, stressors that involve humiliation or **social rejection** are more likely to cause clinical depression than are other stressors and also appear to bring about depression more quickly (Slavich and others, 2009, 2010a). Moreover, some people may be especially sensitive to social pain or rejection.

### Why do you think we feel so bad about humiliation and rejection?

Animal studies have revealed that in primate colonies, such as free-roaming baboon groups, individuals who lose status withdraw, lose their appetite, become more submissive, and show huge and immediate increases in several biomarkers of stress (Sapolsky, 1998).

Some primate species, like the chacma baboons in Zimbabwe, have stress systems remarkably similar to humans. When a dominant male shows aggression to another male and forces submission, the lower-status individual has a strong stress response similar to that of humans who have been rejected.

In evolutionary terms, loss of social status has serious consequences and can threaten survival (Slavich & Irwin, 2014). By taking action to prevent such losses, humans and other primates increase their chances of survival. Thus, perhaps rejection makes us feel bad because we *need* to feel bad; in other words, perhaps the depression or loss of self-esteem that accompanies rejection keeps us from entering into unwise or insecure partnerships, thus protecting us from further rejection or humiliation.

**BEING SHUNNED**  We've read stories, such as Nathaniel Hawthorne's *The Scarlet Letter*, about people in centuries past being shunned by communities for what were considered immoral acts. In the past several decades, we've expanded this type of active rejection to the fine, negative science of passive avoidance—one that can be upsetting and hurtful to the recipient. For most, we get our first taste of shunning in grade school. You know the scenario: a group of friends decides that some kid in the group just doesn't fit in—too fat, too ugly, too poor, too smart, too nerdy, too whatever—and the shunning begins. Unfortunately, this behavior continues for many well into adulthood. When it becomes evident that the shunning is directed at just you, it is like *silent bullying*. You typically do not know why you are being excluded, you just know you are not in the in-group, and may be in no group at all.

If you believe you have been shunned intentionally, you have two options: hold your head up high and move on, not wasting time trying to figure out what you may have done to create the situation. Or, bite the bullet and have a "courageous conversation" with that person, simply saying that you feel he or she is avoiding you and you wonder why. That way you have closure, and it may be that you learn something valuable about yourself or the shunner.

This is what Phil Zimbardo did to solve the social puzzle he experienced when his family moved from New York City to North Hollywood, California, way back when he was in high school. He had always been a really popular kid, liked, admired not only for smarts and leadership skills but also for his athletic abilities in baseball and track. But from the very first day in this new school, he was totally and brutally *shunned*! Classmates would not sit next to him—they would all move away from wherever he sat in the cafeteria or auditorium. This total social exclusion hurt so deeply that he developed severe asthma, bad enough that he would have to stay home when he had not been able to sleep at all. (Obviously this was a psychological protective reaction at work, with induced physical symptoms, known as a psychosomatic reaction.)

In the spring, after making the school's baseball team, on a bus ride to a game, Phil had to know the "why" of his year-long shunning. So he simply asked a teammate what had he done wrong to deserve such social abuse. The answer was startling: "A lot of kids are afraid of you, because they think your family must be from the East Coast Mafia, since you are Italian, the only one in our school, so better to avoid you than take any chances angering you." *Not so*!! He was a skinny, gentle kid, with no connections to any sinister organization. But it no longer mattered; his asthma became the reason the family all moved back to the Bronx, and as you might suspect, his dreaded asthma instantly vanished.

So forgive and forget the shunners, while making more time for all the people who love you unconditionally, and whom you can love fully in return.

## 14.1.3:  Posttraumatic Stress

Individuals who have undergone severe ordeals—rape, combat, beatings, or torture, for example—may experience a belated pattern of stress symptoms that can appear months or even years after their trauma. Those delayed reactions, however, can last a lifetime. In **posttraumatic stress disorder (PTSD)**, the individual reexperiences mental and physical responses that accompanied the trauma. Nearly one adult in 12 in the United States will experience PTSD at some time in his or her life, with symptoms enduring more than 10 years in more than one-third of cases. Traumas described by PTSD victims most frequently include having witnessed another person being killed or badly injured, having lived through a natural disaster, and having survived a life-threatening accident. Men cite more experiences of physical attack, military combat, disaster or fire, or being held captive or hostage, whereas women cite more experiences of rape, sexual molestation, physical abuse, and neglect during childhood (Bower, 1995a). Women are more likely than men to develop symptoms of PTSD after experiencing a traumatic event (Tolin & Foa, 2006), and Hispanic Americans are more at risk than non-Hispanic White or Black Americans (Pole and others, 2005). In addition to PTSD generated by war time experiences, or physical/sexual abuse, the most frequent causes are being in a fatal car accident (as survivor or driver), and natural disasters that devastate one's home and community.

**WHAT ARE THE SYMPTOMS OF PTSD?**  Victims of posttraumatic stress disorder typically become distracted and disorganized and experience memory difficulties (Arnsten, 1998). They may feel emotionally numb and alienated from

others, and experience less pleasure from positive events. Problems sleeping, guilt about surviving, and an exaggerated "startle response" (wide-eyed, gasping, surprised behavior upon perceiving a sudden threat) are common symptoms as well. Rape survivors, for example, may experience a barrage of psychological aftereffects, including feelings of betrayal by people close to them, anger about having been attacked, and fear of being alone (Baron & Straus, 1985; Cann and others, 1981).

Posttraumatic stress disorder can also have lasting biological consequences (Crowell, 2002; Sapolsky, 1998). The brain undergoes physical changes when stress is extreme in intensity or duration. Specifically, the brain's hormone-regulating system may develop hair-trigger responsiveness, making the victim of posttraumatic stress overreact to mild stressors.

**WATCH** The 9/11 Terrorist Attacks in NYC Created Intense Stress



Retired New York City firefighter Stephen King got out of the World Trade Center alive.

The initial stress became chronic as some first responders developed PTSD from prolonged exposure to the toxic environment.

**PTSD IN COMBAT PERSONNEL** Although the term *posttraumatic stress disorder* was coined fairly recently, historical accounts have noted similar symptoms, referred to as "combat fatigue," "shell-shock," or "soldier's heart," in soldiers for centuries. In the wake of the Vietnam War, where early estimates noted symptoms of PTSD in 30% of combat veterans, public attention to the disorder grew. Military psychologists now provide at least some minimal treatment for combat-related stress at deployment sites in Iraq and Afghanistan, for instance, and a variety of educational programs aim to help soldiers and their families prepare more effectively for deployment and to cope better with the aftermath of war once the soldiers have returned home. And even though the military cultural norm has historically taught soldiers not to talk about combat experiences, which contributed to the stigma most veterans felt about asking for help with psychological symptoms, these

new programs are helping participants slowly overcome that barrier to effective coping.

A program entitled *Battlemind*, for example, was created to help soldiers develop realistic expectations of deployment prior to combat and also to help them readjust to life at home when they return from deployment. Initial research indicates that soldiers who participate in Battlemind report fewer symptoms of PTSD than their comrades who receive more traditional training (Munsey, 2007). It is always the case that knowledge about what to expect provides a framework for more appropriate coping when the situation is later experienced.

Increased scrutiny on PTSD in combat personnel has also unearthed a fascinating new finding about the brain's role in certain PTSD symptoms. Prompted by the groundbreaking research of Canadian neurologist Ibolja Cernak (2015), U.S. military doctors now recognize that soldiers exposed to an explosion often develop cognitive symptoms such as memory loss, reduced ability to concentrate, slowed reaction time, and difficulty performing simple math tasks—even if the soldier wasn't hit by the blast. While researchers are still unsure exactly how the brain is affected by the blast, there is general agreement that the force of the explosion causes damage to brain functioning. Up to 20% of soldiers returning from Iraq and Afghanistan are estimated to experience some type of traumatic brain injury such as this, and researchers now think that neurological effects of blast exposure may account for the cognitive deficits seen in some veterans diagnosed with PTSD (Bhattacharjee, 2008).

**A PROMISING NEW TREATMENT FOR PTSD** One new view of this age-old debility is that it is a mental injury rather than a mental illness, caused by a traumatic experience which injures thought processes. Injuries can be cured, can be repaired with the appropriate treatment. An innovative new therapy has proven effective with dozens of veteran survivors from many past wars by teaching them how to develop a balanced time perspective to replace their distorted focus on being stuck in the muck of a past negative time zone. Time perspective is the personal experiences of our temporal world, of being in the past, present, or future. A biased perspective focuses excessively on only one of these time zones, while a more balanced perspective enables us to switch between them according to the task and situation we are engaged in. **Time Perspective Therapy** encourages clients to also remember positive events from their past war time experiences, blended with recalling the things they used to do for fun with family and friends, and then adding in some short- and long-term future goals. This treatment is effective on average in only eight treatment sessions, and reduction of symptoms endures through more than 4 years of follow-ups (Zimbardo and others, 2012).

# 14.2:  Chronic Stressors

**Objective:**  Describe five different chronic stressors

The stressors reviewed in the previous section—catastrophe, personal loss, and posttraumatic stress—involve events that, like the 9/11 attack, occur abruptly. In contrast, **chronic stressors** are continual or repeated, or enduring, and their impact may develop slowly over time. For example, they may involve ongoing financial problems, marital difficulties, or poor living conditions, such as one of the world's worst stress inducers—living in poverty. Here, we examine five different chronic stressors: societal stressors, job burnout, compassion fatigue, major life changes, and daily hassles.

## 14.2.1:  Societal Stressors

For most of us, stress comes not from sudden catastrophic events but from **societal stressors** or prevalent pressures in our social, cultural, and economic environment. These societal stressors often involve difficulties at home, work, or school that are chronic (recurring or continuing over time). Societal stressors also include unemployment, poverty, racism, and other conditions that handicap or oppress individuals because of their social group or status. In America, as now in many nations, ever larger numbers of citizens are living lives without the comforts of a home—they are a new cohort of homeless people living on the streets.

For example, a study of work stress and health revealed that unemployed men experience more depression, anxiety, and worries about health than comparable men with jobs. Almost miraculously, these symptoms usually disappeared when the unemployed individuals found work (Liem & Rayman, 1982). The startling results of a national survey powerfully illustrate the prevalence of stress related to money concerns: About 75% cite money as a source of stress (American Psychological Association, 2015b). Such conditions can exact a toll on both mental and physical health, especially among the poor and minorities.

Prejudice and discrimination can also be significant sources of stress (Contrada and others, 2000). How? For one, high blood pressure among African Americans—long thought to be primarily genetic—is correlated with chronic stress caused by the daily negative impact of having menial jobs, limited education, and low socioeconomic status (Klag and others, 1991). Also, people living in poverty have less access to good health care and are more likely to live in areas containing greater health hazards such as environmental pollutants, lead in their house paint, greater noise, and drug-dealing gangs. Such situational factors affect cognitive development in children and create a variety of adverse physical and emotional factors in adults (Evans and others, 1998; Staples, 1996).

**HOW POVERTY AFFECTS THE BRAIN**   Can you imagine that growing up poor can shrink your brain—starting before birth—and lead to diminished cognitive functioning? That is the disturbing conclusion of new research by a team of neuroscientists who imaged the brains of more than 1,000 children and adults in several U.S. cities. They adjusted their calculations to control for ethnic group differences in brain structure. The brains of children from the lowest income bracket (less than $25,000) had 6% less brain surface than children from more affluent families (income over $150,000). Within the poorest families, incomes of even a few thousand dollars less correlated with even higher losses in brain areas. The areas most devastated by this brain surface loss were those involved in language processing and decision-making skills, memory, and reading. This means that a child who grows up in poverty begins school with an enormous barrier to successful functioning in school, as well as in many other life domains (Noble & Sowell, 2015).

**MEDIA GENERATED EMOTIONS AS A SOCIETAL STRESSOR**   Some of our sources of stress come via the media with graphic reports of tragedies in different parts of our nation. We learn of high school shootings, kidnappings, plane crashes, and other events that challenge our sense of morality and equanimity. Bad things, evil things, are happening to innocent, good people. Even though we do not know any of them personally, we can imagine the suffering, and doing so makes us feel sad. But that sympathetic emotion can change to a more negative one of anxiety when we imagine it might happen to us or our loved ones. Do you think people's emotions would differ the closer they were to the source of the media event—closer in spatial distance and temporal distance (time) from its occurrence?

A team of researchers from Columbia University examined these ideas using a novel but now familiar source of evidence—tweets! They tested the common-sense notion that the intensity of the emotional response related to a media event would *decrease* as the physical distance between the respondent and the event increased. They also wondered if emotional intensity would decrease as temporal distance increased (more intense immediately after the event, lesser with the passage of time). They examined tweets (short messages containing a maximum of 140 characters) occurring in the 6 months following the shooting at Sandy Hook Elementary School, in Newtown, Connecticut, on December 14, 2012. They found that as the time and distance from the tragedy increased, the amount of sadness indicators in tweets *decreased*—but the number of anxiety indicators in tweets *increased.* So, over time and with more distance, people felt less sad, but more anxious. (See Figure 14.3.) The increase in anxiety was associated with increases in language reflecting causal thinking about the event. In other words, people with more anxiety were spending more time wondering how it happened, imagining the sequences of action, and considering the possibility that it could happen again (Doré and others, 2015).

---

**Figure 14.3** Using Twitter to Study Stress Following the Sandy Hook Tragedy

People felt saddest when they lived close to the tragedy and soonest after the tragedy. Anxiety levels, however, increased as time went on, as they worried about how it happened and whether it could happen again.



## 14.2.2: Burnout

Having a job, however—even a high-paying one—does not inoculate one against stress. On the contrary, it can include chronic stressors of its own, which can have both emotional and physical consequences for the employee. Continually stressful work can lead to **burnout**, a syndrome of overwhelming exhaustion, feelings of cynicism and detachment from the job, and a sense of ineffectiveness and lack of accomplishment (Maslach & Leiter, 1997). Christina Maslach, a leading researcher on this widespread problem, notes that burnout was first recognized in professions demanding high-intensity interpersonal contact, such as physicians with patients, teachers with students, and social workers with clients (Maslach, 1982). We now know that burnout can occur anywhere—even among college students, stay-at-home parents, or volunteer workers. People experiencing burnout report feelings of detachment, failure, and cynicism about co-workers and clients. They seek escape and avoid their work, leading to decreased personal accomplishment. Burnout has been found to correlate with many negative consequences: absenteeism, job turnover, impaired performance, poor co-worker relations, family problems, and decreased personal health (Maslach and others, 2001; Schaufeli & Enzmann, 1998). In some nations where citizens get extended sick leave based on their level of stress-related burnout, the cost can run into hundreds of millions in required treatment and benefits. Burnout, then, stands as another powerful source of chronic stress.

More recently, research has focused on the positive alternative to burnout, labeled **work engagement**

(Schaufeli & Bakker, 2004). The practical significance of this burnout–engagement continuum is that engagement represents a desired goal for burnout interventions. This new framework leads people to consider what factors in the work place are likely to enhance employees' energy, vigor, and resilience; promote their involvement and absorption with work tasks; and ensure their dedication and sense of efficacy and success on the job.

Although there is some evidence for individual risk factors for burnout, there is far more evidence for the importance of situational variables. In other words, the work place carries far more of the predictive weight for burnout than does personality. More than two decades of research on burnout across many occupations in various countries have identified a plethora of organizational risk factors (Maslach and others, 2001; Schaufeli & Enzmann, 1998). However, rather than posing an "either/or" question ("is it the person *or* the job?")—it may well be that an "and" question is the better way to frame the issue. That is, there are both personal *and* situational variables that determine burnout, and the key issue is how best to conceptualize their combination or interaction.

Early models in the field of industrial-organizational psychology (French and others, 1974) theorized that a better fit between the employee and the work place would predict better adjustment and less stress. Building on those models, Maslach and Leiter (1997) formulated a burnout model that measures the degree of match or mismatch between the individual and key aspects of his or her organizational environment (see Figure 14.4). The greater the gap, or mismatch, the greater the likelihood of burnout;

**Figure 14.4** Work Life and Burnout

A schematic model of six input factors affecting burnout and five measurable outcomes.



conversely, the greater the match (or fit), the greater the likelihood of work engagement.

What are these key aspects of the organizational environment? Six major areas of work life have been found relevant to employee/work place fit: workload, control, reward, community, fairness, and values (Maslach & Leiter, 2005).

1. *Workload* and *control* refer to the amount of work and the degree of autonomy enjoyed by the worker.
2. *Reward* refers to the relative match between the rewards offered by the job and those valued by the employee.
3. The degree of social support or interpersonal conflict in the work place make up the fourth factor, which is *community*.
4. *Fairness* is assessed by the match between the employee's sense of equity and social justice and that of the organization.
5. The final factor, *values*, recognizes the cognitive and emotional power of job goals and expectations.

Mismatches between the employee and the organization in these six key areas have been found to predict burnout, making researchers optimistic about the possibility of developing early-detection and intervention procedures to promote greater job engagement (Maslach & Leiter, 2008).

Thus, burnout is not simply a personal problem or a weakness in individual character, as was once thought. Effective burnout prevention requires both managers and workers to take responsibility for developing conditions that improve engagement with the job, create a better "fit" between employee and job, and make decisions that focus on the long-term health of the employees and the organization (Leiter & Maslach, 2014).

## 14.2.3: Compassion Fatigue

After the 9/11 attacks, New York Ladder Company 5's Lieutenant O'Neill joined others in day after day of fruitless rescue searches. One day, instead of going home, O'Neill checked into a hospital and asked for help with stress-related symptoms he was experiencing. He met with

a doctor to whom he poured out the story of the horrors he had seen. Contrary to O'Neill's assumption that, as a doctor, "He . . . could handle this," the doctor himself went to the hospital psychologist after treating O'Neill. "[H]e kind of lost it," O'Neill learned. "He had become freaked out from the story I told him, because he lost a friend from the tragedy. . . . He didn't show up for work for a couple of days" (Smith, 2003b, p. 259). Even medical professionals and therapists, though trained to be objective, are at risk for the stress of **vicarious traumatization** (Sabin-Farrell & Turpin, 2003).

When medical professionals, caregivers, and therapists are overexposed to trauma and its victims, they are at risk for **compassion fatigue**, a state of psychological exhaustion that leaves caregivers feeling stressed, numb, or indifferent to those in need after extended contact with sufferers (Figley, 2002). Compassion fatigue is also called *secondary traumatic stress* because it afflicts the helpers, who "catch" the stress suffered by the victims. Consequences are similar to burnout in that it leaves people unhappy with their work and resistant to contact with people they are supposed to help. Dreading further stories of trauma, fatigued helpers may emotionally withdraw from their clients and overuse the "silencing response," distracting, minimizing, or redirecting what their clients are saying to reduce their own discomfort and pain (Baranowsky, 2002). When therapists or religious counselors feel unable to listen to their clients or parishioners, they can no longer function as effective healers. Compassion fatigue and burnout harm not only the providers and receivers of care and attention but entire professions as well. Fortunately, healers can learn the warning signs in time to take action—and researchers can suggest what kinds of action to take:

- First, caregivers must focus on their sense of **compassion satisfaction**, an appreciation of the work they do that drew them to their professions in the first place. Creating and maintaining a sense of team spirit with co-workers can increase compassion satisfaction. Whenever possible, caregivers and rescue workers should be able to see clients recover so they realize their work is effective (Collins & Long, 2003).

- While it is important to care for those one is helping, helpers must avoid becoming overinvolved, or their lack of control over most of their clients' experiences can lead to a sense of defeat (Keidel, 2002).

- Novice trauma counselors may simply distance themselves from stressful exchanges; more experienced workers are better able to cope directly with their own stress (Pinto, 2003).

- Caregivers should resist overvolunteering. Volunteers who worked with more than one agency or effort after 9/11 were at greater risk for compassion fatigue than those who volunteered with only one organization, such as the American Red Cross (Roberts and others, 2003).

- Finally, professional helpers and emergency workers should use humor—but use it carefully! While tasteless jokes and dark humor with fellow workers can relieve anxiety and establish a sense of camaraderie among co-workers, workers must be cautious with these types of humor. Because it is not publicly acceptable to laugh in the face of tragedy, humor should be expressed selectively, with sensitivity to the environment, so as not to offend or further hurt those already suffering (Moran, 2002).

## 14.2.4: Major Life Events

The beginning or end of a relationship is always a time of adjustment, accompanied by emotional ups and downs, tension, and turmoil. Earlier in this section, we discussed the effects of sudden interpersonal loss. Other changes can cause stress as well: a new job, starting or finishing college, or—ironically—even taking a vacation! Even events we welcome, such as the birth of a child, often require major changes in our routines and adaptations to new demands and lifestyles. Especially when the events are considered positive events (such as an exciting new job or getting married), we may not recognize their potential impact on our stress level. In general, any change can generate distress; the bigger the change in our lives, the bigger the impact.

What if a simple questionnaire existed that would assess your current stress level? Several decades ago, psychologists Thomas Holmes and Richard Rahe (pronounced *RAY*) developed just such a tool. They first identified a variety of common stressful events and had a large number of respondents rate the events in terms of how stressful each one was in their own lives. After analyzing all the results, they created the **Social Readjustment Rating Scale (SRRS)**, which lists 43 life events—ranging from death of a spouse at the high end to pregnancy or a new job in the middle to getting a traffic ticket at the low end. Each life event is assigned a particular number of life-change units (LCUs), so anyone can calculate his or her current stress

level by adding up the LCUs for each life change that was recently experienced.

Research has indeed found relationships between life changes and stress. The birth of a child, for example, is often associated with lower marital satisfaction (Cowan & Cowan, 1988). Since it was developed, the SRRS has been used in thousands of studies worldwide and has been found to apply cross-culturally. We must be cautious in interpreting our scores, though, in light of what we know about the role of **cognitive appraisal** in stress. An undergraduate version of the scale, developed specifically to reflect student stress reactions, gives you the opportunity to assess your own stress level in the *Do It Yourself!* box (Crandall and others, 1992).

---

## Do It Yourself!
### The Undergraduate Stress Questionnaire: How Stressed Are You?

This 82-item survey asks students to complete a checklist of stressful events that they have experienced in the past week. The purpose of this simulation is to provide you the opportunity to complete this questionnaire so that you might be more aware of the stressors operating in your life and perhaps take steps to reduce the amount of stress you are currently experiencing, thereby reducing the likelihood that you might become ill. Take the survey: https://media.pearsoncmg.com/ab/ab_lefton_psychology_8/media/sim18/sim18.html

---

## 14.2.5: Daily Hassles

After a difficult workday, you get stuck in a traffic jam on your way to the grocery store. Finally arriving, you find they don't have the very item or brand you wanted. After selecting a substitute, you proceed to the checkout, only to be snapped at by an impatient clerk when your credit card is one not accepted there. Taken individually, such minor irritations and frustrations, known as **hassles**, don't seem like much in comparison to a natural disaster. But psychologists confirm that the stress effects of hassles can accumulate, especially when they are frequent and involve interpersonal conflicts (Bolger and others, 1989).

In our fast-moving, highly technological society, a major life hassle is "waiting." Waiting for anything, instead of having it instantly available, has become a modern stressor: waiting for public transportation, waiting for service in a store or restaurant, waiting in traffic, waiting for your computer to boot up or download files.

Any annoying incident can be a hassle, but some of the most common hassles involve frustrations—the blocking of some desired goal—at home, work, or school. In a diary study, a group of men and women kept track of their daily hassles over a 1-year period, also recording major life changes and physical symptoms. A clear relationship emerged between hassles and health problems: The more frequent and intense the hassles people reported, the poorer their health, both physical and mental (Lazarus, 1981, 1984, 1999). The opposite was also true: As daily hassles diminish, people's sense of well-being increases (Chamberlain & Zika, 1990). Thus, a life filled with hassles can exact as great a price as that of a single, more intense stressor (Weinberger and others, 1987).

**Cognitive appraisal** plays a role in the impact of hassles as well. If you interpret a frustrating situation as "too much" to deal with or as a major threat to well-being, it will affect you more than if you dismiss it as less important (Lazarus, 1984).

Some people may be especially prone to see the world as hassle filled. One study showed that college students with a pessimistic outlook experienced both more hassles and poorer health (Dykema and others, 1995). This finding serves as a good reminder that correlation does not imply causation: In other words, we know a correlation exists between hassles and health but do not know what causes the link. On one hand, experiencing many hassles may have a negative impact on health—but on the other hand, having more health problems to begin with might increase a person's perception of minor annoyances as hassles. It is also possible that a third variable—something other than hassles or health—might be driving the correlation: For example, pessimists (as noted earlier) might be more likely to perceive minor annoyances as hassles and also more likely to have health problems.

One way to de-stress your life is to reconsider your own daily hassles. Look back on recent frustrations with a sense of humor, put problems in perspective, and consider just how unimportant such difficulties and delays really turned out to be. By reappraising everyday difficulties as minor, you enable yourself to remain good-natured and productive and even to have a good laugh. Shake your head, put on the brakes, let the vending machine keep your dollar—and move along. Daily hassles are idiosyncratic; each person experiencing them interprets them uniquely. What is a hassle or an annoyance to you may be unnoticed or even amusing to someone else. One person's agonizing traffic jam is another person's opportunity to listen to the radio, catch up on a favorite podcast, or engage in people watching. If your life seems hassle filled, some reappraisal of regularly irritating situations can save you psychological wear and tear. It almost always helps to connect with nature, take a walk in a park or on a beach, swim, hike, bike, even visit a local zoo. Later, we will see how cognitive reappraisal can play a central role in one's general strategies for coping with stress.

## WRITING PROMPT

**Reframing Your Hassles**

Think of a time recently when your usual routine was suddenly disrupted by something out of your control: perhaps there was no available Internet; the line at Starbuck's was really long and not moving very fast; your car was out of action from a hit and run driver, or something else like that. What are two things you can do to turn that "down time" into "up time" for reflection and fun?

▶ | `The response entered here will appear in the performance dashboard and can be viewed by your instructor.`

Submit

## Psychology Matters

# Student Stress

It's timely for you to be studying stress and well-being right now, because merely being a college student qualifies as a stressor. College freshmen in particular undergo major challenges in making the transition to college life. One study found that freshman stress unfolds in three phases.

1. First, new students experience the shock and excitement of new roles, environments, and social relationships.
2. Next comes a protracted period of disillusionment and struggle as students face both the serious work and mundane chores of academic life.
3. Finally, as roles gel and mastery develops in at least some efforts, a sense of improved well-being and possibilities emerges (Rambo-Chroniak, 1999).

But stress isn't limited to first-year students. All students experience a specific pattern of stress during the school year, with stress peaks at the beginning, middle, and end of each term (Bolger, 1997). Two points in time are particularly difficult: the "midwinter crash" and the final exam period, when studying competes with regular sleep and healthy eating and when flu and cold viruses afflict those with low resistance.

Some causes of student stress are obvious, with academic pressure topping the list (Bolger, 1997). Also, new social interactions increase the possibility of problems in interpersonal relationships (Edwards and others, 2001). Romantic love, often a source of joy, can also be a source of stress and illness, especially among college women (Riessman and others, 1991). And when romance sours, breakup stress soars. An investigation of a large group of

university students who had experienced a recent breakup of a romantic relationship was studied to determine its causes. Those who felt most distress from their breakup reported a *loss of intimacy* as the main cause for the breakup itself, leading to their failed romance; not as central were affiliation needs, sexuality, or autonomy reasons (Field and others, 2010).

Perhaps the essential source of stress for traditional-aged college students is freedom—specifically, the lack of structure in a college environment as contrasted with the structure of home and high school curriculum (*USA Today*, 1996). For students returning to college after years in the workforce or raising children, stress often involves the challenge of "retraining the brain" to process and retain massive amounts of new information—in quick time for exams.

And stress seems to be on the rise among college students. In a recent national survey, college freshmen and women reported record-low levels of emotional health: only 52% felt they had "good or above-average emotional health." This marks the lowest point since the survey first asked the question in 1985. The same survey also found that 76% rated their drive to achieve as "above average or in the highest 10%"—the highest point since 1985. More students than ever before admitted they frequently felt overwhelmed. Gender effects were also found: Only 46% of women reported their emotional health as "good" compared to a higher 59% of men. What do you think might account for this difference (Sieben, 2011)?

Solutions for student stress, fortunately, may be within arm's reach—the distance needed to reach for the phone and call a friend for support or the college health center, counseling office, or tutoring center for professional advice. Most students express a reluctance to seek help (Rambo-Chroniak, 1999), so simply overcoming this ambivalence—especially as an enlightened student of the many uses of psychology—can be a step toward feeling better. Young adults do better if they have positive attitudes about becoming independent individuals on a course of normal separation from their parents (Smith, 1995).

In terms of self-help, students report better results when taking specific action to resolve the problem rather than simply dwelling on their emotional response (Smith, 1995). Cultivating more hopeful attitudes and better self-esteem—for example, by setting and meeting realistic goals—also leads to lower stress and better adjustment. Students appear to be more adaptive if they report better social support and a greater sense of control in their lives (Rambo-Chroniak, 1999). Involvement in student organizations can offer both structure and social contact, but beware of the stress of excessive commitment (Bolger, 1997). Two qualities in particular characterize students who are most effective in preventing and coping with stress:

1. *Resilience*, based in part in self-acceptance, effective communication, and coping skills
2. *Cognitive hardiness*, an ability to interpret potential stressors as challenging rather than threatening (Nowack, 1983; Yeaman, 1995)

# Key Question: How Does Stress Affect Us Physically?

**Core Concept 14.2**

**The physical stress response begins with arousal, which stimulates a series of physiological responses that in the short term are adaptive but that can turn harmful if prolonged.**

Since our earliest days on Earth, humans have survived by responding quickly and decisively to potentially lethal attacks by predators or hostile tribes. Our ancestors adapted to an enormous variety of environmental conditions worldwide, confronting climate extremes, scarce resources, and hostile neighbors. Faced with these challenges, quick action was necessary to obtain shelter and protection, to find food, and to defend themselves. The faster an individual was to feel fear or anger, appraise the situation accurately, and take appropriate action, the better his or her chances of success and survival. Those who responded most quickly and effectively to danger survived and passed those responsive genes to their offspring, whereas slower or less-clever individuals were less likely to survive and bear children in the course of human evolution.

Some of the serious stressors confronting our ancestors, such as catastrophe or combat, continue to face us today. Modern life, of course, adds some new dangers: demanding jobs, financial worries, and computer crashes. More often chronic in nature, these new threats aren't necessarily solved effectively with the same responses that suited our ancestors and their more immediate challenges. Yet, our stress response system remains the result of our ancestors' evolutionary legacy, because human physiology cannot evolve and change nearly as fast as our societies have. This ancient biological script is retained in our body's automatic responses to frightening or enraging conditions. If someone insults you, your face feels hot and your fists seem to clench by themselves, readying you for a physical contest. Or imagine a very different sort of "threat": Your instructor calls on you in a class discussion for which you are unprepared. Your heart races, your knees feel wobbly, and you feel the urge to run away.

These examples illustrate the two poles of the **fight-or-flight response**, a sequence of internal and behavioral processes triggered when a threat is perceived, preparing the organism for either struggle or escape. This response worked very well for our predecessors but doesn't always suit us as well today. After all, is running out of the classroom really an effective response to being called

on in class? The core concept for this section summarizes this point:

> The physical stress response begins with arousal, which stimulates a series of physiological responses that in the short term are adaptive but that can turn harmful if prolonged.

Amazingly, we deal with stress effectively most of the time, managing to be not only healthy but even happy. But, as you will see in this section, there can be serious consequences when we don't deal effectively with stress—no matter what its source. On the positive side, we should emphasize that the emotional arousal we call stress usually works to our advantage. It brings threatening events into focus and readies us to respond. On the negative side, extreme or prolonged emotional arousal threatens our health. The results can include physical conditions such as heart disease, stroke, high blood pressure, and ulcers. Our mental health can also suffer.

Some of us are prone to "worrying ourselves sick" by anticipating what might go wrong, from minor irritants to major traumas (Sapolsky, 1994). Depression, as well as PTSD and other anxiety disorders, has direct linkages to stress. We see these consequences not only in emergency response workers and air traffic controllers but also in public- and private-sector employees at all status levels and in people of all ages and all walks of life. Let's take a closer look at the physiology of our stress response, which will lay the foundation for a clear understanding of exactly how this adaptive response triggers negative health consequences when chronic stress strains the limits of our resources.

By the end of this section, you will be able to:

**14.3** Describe the physiological responses to stress

**14.4** Discuss the negative impact of stress on the immune system

# 14.3: Physiological Responses to Stress

**Objective:** Describe the physiological responses to stress

Firefighters usually report that they love their work, and for some the job is a family tradition. But their camaraderie and commitment cannot lessen the threat, the risk of injury and death—the stress they experience—when they answer the alarm and race into harm's way. How does the body of an experienced firefighter respond to the perception of that stressor? And what about your own physical responses to stress?

## 14.3.1: The Fight-or-Flight Response

When a stressful situation begins suddenly—as when a professional firefighter first hears the alarm—the stress response begins with an abrupt and intense physiological arousal produced by the **autonomic nervous system (ANS)**. Signs of this arousal include accelerated heart rate, quickened breathing, increased blood pressure, and profuse perspiration. This scenario illustrates a case of **acute stress**, a temporary pattern of stressor-activated arousal with a distinct onset and limited duration first described by physiologist Walter Cannon a century ago (Cannon, 1914).



In cases of acute stress, such as this woman faces as a forest fire nears her village in Portugal and threatens her home, the stressor arises suddenly, and the stress response begins with abrupt and intense physiological arousal.

Almost instantaneously, reactions in our nervous system, endocrine system, and muscles equip us to make an efficient and effective response—supplying, for example, extra strength if needed. Figure 14.5, p. 552 provides a detailed illustration of the many ways the body prepares for an emergency response.

The fight-or-flight response can be a lifesaver when you need to escape from a fire, confront a hostile rival, or swerve to avoid an oncoming car. When faced with a chronic stressor, though, it has a cost: Staying physiologically "on guard" against a threat eventually wears down the body's natural defenses. In this way, facing frequent stress—or frequently interpreting experiences as stressful—can create a serious health risk: An essentially healthy stress response can become a health hazard. In the next section, we will explore exactly how and why this occurs.

## 14.3.2: The General Adaptation Syndrome

Our understanding of how stress causes illness began in the mid-20th century with the work of Canadian endocrinologist Hans Selye (pronounced *SELL-yeh*). In brief, Selye (1956, 1991) discovered that different stressors trigger essentially the same systemic reaction, or general physical response, which mobilizes the body's resources to deal

**Figure 14.5** Bodily Reactions to Stress

An amazing array of physiological reactions prepare us to fight or flee in acute stressful situations.



Blood vessels in skin, skeletal muscles, brain, and viscera constrict.

Pupils dilate, accommodate far vision.

Bronchi dilate.

Heart rate accelerates, strength of contractions increases.

Sweating increases

Digestive tract decreases peristalsis.

Skin and body hair produce "goose pimples."

Liver releases sugar into the bloodstream.

Adrenal glands stimulate adrenalin secretion, increasing blood sugar, blood pressure, and heart rate.

Secretions of the pancreas decrease.

Secretions of digestive fluids decrease.

Anal sphincter closes.

Urinary bladder relaxes

Urinary sphincter closes.

Blood vessels in external genitalia dilate.

with the threat. Moreover, he found, all stressors provoke some attempt at adaptation or adjustment of the body to the stressor. Because the bodily response was a general rather than a specific adaptation effort, Selye dubbed it the **general adaptation syndrome (GAS)** (see Figure 14.6).

In acute stress, these responses help us survive and thrive, but under chronically stressful conditions, they can lead to heart disease, asthma, headache, gastric ulcers, arthritis, and a variety of other disorders (Carlson, 2007; Salovey and others, 2000). Selye's model of the GAS

**Figure 14.6** The General Adaptation Syndrome



*Stage 1: Alarm reaction*

General arousal caused by:
• increase of adrenal hormones.
• reaction of sympathetic nervous system.

If stressor is not removed, organism moves to Stage 2.

*Stage 2: Resistance*

Arousal subsides because of:
• decrease in adrenal output.
• counter reaction of parasympathetic nervous system.

If stressor is not removed, the organism moves to Stage 3.

*Stage 3: Exhaustion*

General arousal of Stage 1 reappears.

Powerful parasympathetic response opposes arousal.

If stressor is not removed in time, death occurs.

Level of normal resistance

Illness/death

Alarm reaction

Resistance

Exhaustion

describes a three-phase response to any threat, consisting of an alarm phase, a resistance phase, and an exhaustion phase (Johnson, 1991; Selye, 1956, 1991).

**THE ALARM PHASE**  In the first stage of stress, the body's warning system activates and begins to mobilize its resources against the stressor. Selye called this first stage the **alarm phase**—but it is similar to the pattern of reactions Cannon called the fight-or-flight response. The **hypothalamus** sets off two parallel emergency messages. One message signals the hormone system, especially the adrenal glands, through the pathway shown in Figure 14.7. The result is a flood of steroid hormones into the bloodstream—chemicals that support strength and endurance (the reason why some athletes might risk dangerous side effects by abusing steroids). **Endorphins** are also released, which reduce the body's awareness of pain signals. A concurrent message is relayed through the **sympathetic division of the autonomic nervous system** to internal organs and glands, arousing the body for action.

**Figure 14.7**  Hormonal Response in the Alarm Phase

In the alarm phase of the GAS, the hormone system response shown here is one of the two parallel response pathways set off by the hypothalamus.



It's the cascade of messages through these two pathways—the sympathetic nervous system and the **endocrine system**—that readies us for action. Blood flow to the heart, brain, and muscles increases, enabling us to think and react better and faster. Blood flow to the digestive system, conversely, decreases—presumably so our bodies are not expending precious energy on nonessential functions during an emergency. Pupils dilate, enhancing peripheral vision, and perspiration helps keep the body from over-

**Figure 14.8**  Sympathetic Nervous System Response in the Alarm Phase

This diagram shows the path of the sympathetic nervous system's response to acute stress, which occurs simultaneously with the parallel response of the hormone system.



heating. Available blood sugar increases as well, to provide an additional energy boost. All in all, our body is highly attuned to immediate danger. Figure 14.8 details this autonomic series of responses.

The function of the alarm phase is to enable the organism to fight or to flee from the threat, which usually didn't last very long for our ancestors. Given the chronic nature of modern stresses, though, we often progress into the second stage—resistance.

**THE RESISTANCE PHASE**  If the stressor persists—but is not so strong that it overwhelms us during the first stage—we enter the **resistance phase**, during which all the physiological changes of the alarm phase remain in effect. During this stage, the body attempts to fight off the effects of the stressor. The immune system is in high gear as well, and white blood cell count increases to help fight off infection.

Surprisingly, the resistance during this stage applies only to the original stressor. In his research, Selye found that if an experimental animal had adapted to one stressor (e.g., electric shock), but a second stressor was introduced (e.g., extreme cold), the animal soon died. The animal's resources were apparently so depleted it could not mobilize a defense against the new stressor. A tragic human example is found in a soldier who collapses and dies in response to the new stress of a prison camp after surviving months of stressful combat.

Thus, we see that our alarm and resistance defenses use physical energy. They reduce the resources available in case of additional stressors. Imagine this scenario, for example: You've just completed final exams; you've had minimal sleep, studying day and night, surviving on junk food and caffeine for a week. Now it's over. You can relax and rest at last. But the phone rings: It's the welcome voice of the love of your life, with an unwelcome note of some negative emotion. Before you can announce the good news that you survived your exams, the voice says, "I don't know how to say this, but—look, we have to talk. . . ." This is probably not good news and may signal serious trouble, even a breakup—definitely a stressor. Already exhausted by the stresses of finals week, how will you handle this important conversation? You feel stricken, frightened, and even angry: Why this threat? Why now? Because your system is depleted, you may overreact and find yourself without the cognitive and emotional resources to handle the situation effectively.

**THE EXHAUSTION PHASE** The resistance phase is the body's last-ditch effort to combat the stressor, and if the stressful situation is not ameliorated during that phase, the body can no longer keep up its intense physiological battle. In this third stage, the **exhaustion phase**, body functions drop back into normal range—and then fall below normal. At this point, the body requires rest and rejuvenation to bring our physiological functioning back up to acceptable levels. If it does not get that much-needed respite, as is often the case in today's world of chronic stressors, the very responses that were so adaptive in the first two phases put the body at risk for illness in the third phase.

Several processes may contribute to the physical and mental deterioration seen in the exhaustion phase. For example, increased blood pressure can cause headaches in the short term and, over an extended period of time, contribute to stroke and coronary heart disease (CHD)—two leading causes of death. Meanwhile, the compromised digestive system contributes to formation of certain types of ulcers and, over the long term, obesity. Chronic stress is also linked to increased fatty deposits in the bloodstream, which increases risk of stroke. Still other dangers lurk in the depleted immune system, making the stressed person a prime candidate for infections or other diseases. In addition, prolonged or repeated stress may produce long-term changes in the brain that provoke depression (Sapolsky, 1998; Schulkin, 1994). Stress hormones also act on the brain, interfering with its ability to regenerate neurons, especially in the **hippocampus** (Gould and others, 1998; Sapolsky, 1998). This helps explain why prolonged use of steroids— which are really stress hormones—is dangerous (except under certain medical conditions): Long-term steroid use effectively sends the body into the final stage of the GAS, the stage of exhaustion, producing perilous deterioration.

So we see that Selye's GAS model offers a useful explanation of how stress can lead not only to the initial **fight-or-flight response** but also to chronic and debilitating conditions. And while new research is beginning to reveal that not all stresses produce exactly the same response from the endocrine system (Kemeny, 2003), the model remains widely accepted as the key to understanding the link between stress and illness. Before we look more closely at the details of the chronic stress response, let's first consider an intriguing alternative to fight-or-flight: nurturance.

### 14.3.3: Tend and Befriend

Psychologist Shelley Taylor noticed that the fight-or-flight model was developed by male theorists doing research with male subjects—male rats, mice, and humans. The fear and aggression so prominent in fight-or-flight may, noted Taylor, characterize the responses of males more than females (Taylor, 2003; Taylor and others, 2000b). A tend-and-befriend model may better explain the behavior of females in response to threats to themselves and their offspring. Taylor's theory argues that, because females are the primary caretakers of offspring, female biology assigns priority to protecting the survival of the young. From this perspective, fight-or-flight makes no sense. Aggression ("fight") can cause injury to oneself or one's children; escape ("flight") leaves children defenseless. Neither response promotes adaptation and survival from the female caregiver's point of view (Volpe, 2004).

This **tend-and-befriend** model proposes that females are biologically predisposed—through brain and hormonal activity—to respond to threat by nurturing and protecting their offspring. Seeking social support creates networks that increase an individual's ability to protect and nurture (Eisler & Levine, 2002; Taylor and others, 2000b). One study in support of the tend-and-befriend model examined men's and women's hormonal changes and self-reports prior to an important examination. While reported anxiety levels did not differ, men had significantly higher levels of **cortisol** production than did women (Ennis and others, 2001). Additional research reveals that **oxytocin**, another stress hormone, may combine with estrogen in females to prompt affiliation-seeking behavior (Taylor, 2009). Higher oxytocin levels are also associated with greater calmness and decreased anxiety, which are important components of effective nurturing.

It might surprise you to know that both men and women seek social support as a stress response, although evidence at this point indicates women respond this way more frequently and consistently than men (Tamres and others, 2002). For women with early-stage breast cancer, for example, emotional support from their spouses buffered their daily stress (Gilmore and others, 2011). Importantly, however, the amount of support they needed from their spouses rose as their level of distress rose. Researchers urge spouses to understand the greater need and find ways to provide it rather than becom-

ing disheartened and giving up. And doing so may benefit their own health; research indicates a lower mortality rate for older adults who give help and emotional support to friends, relatives, and neighbors (Brown and others, 2003).

The picture emerging from these complementary responses to stressful situations—fight-or-flight and tend-and-befriend—is of a more complex stress response than previously thought. We now see a response system that has evolved to enable both self-protection and reaching out to others in times of danger (Pitman, 2003). Tending and befriending powerfully complements the fight-or-flight pattern, together accounting for the survival not only of individuals but also of relationships and communities.

**WATCH** Social Eating in Response to Stress



When you're feeling stress, do you like to eat in the company of friends? Scientists

This video explains how genetic research with worms is helping researchers understand how different genetic sequences trigger some to eat socially when stressed, and others to isolate themselves. It dovetails with these two theories on responding to stress.

# 14.4: Stress and the Immune System

**Objective:** Discuss the negative impact of stress on the immune system

Earlier in this section, we noted that the immune system becomes compromised in the face of stress—specifically, when we enter the exhaustion phase of the **GAS**. Research has shown, for example, that individuals coping with the death of a spouse or the end of an important long-term relationship are frequently subject to both depression and **immunosuppression**, leaving them more vulnerable to disease (Cohen & Syme, 1985; Kiecolt-Glaser & Glaser, 1987, 2001).

## 14.4.1: Psycho-neuroimmunology

In recent years, advances in biotechnology have spurred the development of an exciting new field that seeks to under-

stand how stress causes disease. **Psycho-neuroimmunology** pulls together psychologists with expertise in psychological factors of stress, such as cognition and emotion; neuroscientists, who study brain functioning; and immunologists, who have extensive knowledge of the immune system. While the field has an impressive multisyllabic title, interest in the mind–body connection is not new: in many ways, psycho-neuroimmunology is simply the rigorous study of questions pondered more than 2,000 years ago by ancient civilizations such as the Greeks and Chinese.

## 14.4.2: Bi-directional Links Between the Brain and Body

A primary goal of psycho-neuroimmunology is to examine how psychological and immunological processes influence each other and, in turn, how they are influenced by the external social world. Fundamental to this mission is the fact that the brain and periphery of the body communicate in a bidirectional fashion (Maier & Watkins, 1999). When a stressor is experienced, for example, the brain signals the adrenal glands to secrete cortisol, a major stress hormone. Cortisol then sends signals back to the brain to regulate its own production (Maier & Watkins, 2000). Psychological stress also activates the immune system. Among the chemical messengers shuttling between the brain and the immune system are proteins known as **cytokines**. One of the most interesting aspects of cytokines is that they signal the central nervous system to elicit behavioral changes that include fatigue, fever, and social-behavioral withdrawal. These changes are helpful because they help organisms recuperate and recover from illness or injury (DeAngelis, 2002a). If prolonged, however, these changes can increase risk for disorders such as psychological depression. Again, we see the parallels with the functioning of the general adaptation syndrome, GAS.

In one of the first studies to examine how the brain regulates cytokine responses to stress, psychologist George Slavich asked participants to give an impromptu speech in front of an imposing panel of raters wearing white lab coats. As expected, people's cytokine levels increased significantly during the impromptu speech (Slavich and others, 2010b). Next, he scanned participants' brains while they played a virtual ball-tossing game in which two other players suddenly excluded them. When Slavich examined the cytokine and brain data together, he noticed that people who had greater brain-activity responses to being rejected had also exhibited more cytokine activity during the speech.

**What conclusions can we draw from these results?**

You'll recall that in addition to acting as "chemical messengers," cytokines can promote specific behaviors such as social-behavioral withdrawal. Consequently, the Slavich study helps explain how social stressors outside the body are translated into biological changes that can increase some individuals' risk for disorders like depression.

**Figure 14.9** Stress and Lifestyle Can Shorten the Life of Cells

Senescence, or age-related deterioration of our cells, can be accelerated by stress and lifestyle.



**STRESS AGES CELLS** Psychological stress can also affect physical health by accelerating the rate at which cells age. One way to assess a cell's age is to measure the length of its **telomeres**. Figure 14.9 outlines how the process occurs. In humans, telomeres shorten across the life span. Importantly, however, their length is associated with a number of diseases, including cancer, cardiovascular disease, and diabetes. Recent research reveals that telomere length is clearly associated with earlier mortality (D'Mello and others, 2015; Wentzensen and others, 2011; Zhao and others, 2013).

In a landmark study examining the effects of stress on telomere length, psychologist Elissa Epel examined whether telomere length was related to being a maternal caregiver for a child with a chronic condition or with feelings of stress. She found that perception mattered more than mere exposure to a stressful situation—a classic finding in stress research. Specifically, feelings of high stress were associated with accelerated rate of immune cell telomere shortening (Epel and others, 2004). Just being a caregiver was not associated, but *duration* of the stressful situation also mattered. The longer her child had the condition, the shorter the mother's telomeres were. Since that study, it has also become clear that experiencing highly stressful events during childhood is another culprit leading to shorter telomeres (Price and others, 2013).

It is thought that chronic or traumatic stress may work in part by shaping how we see everyday stressful events. Cognitive appraisals of threat, expecting bad things to happen, and expecting you cannot do well appears to account for at least part of the stress–telomere relationship. For example, feeling more threatened by the idea of doing a stressful task in the lab, or expecting more negative outcomes in life (pessimism) are both associated with shorter telomeres (Ikeda and others, 2014; O'Donovan and others, 2009). This is an important point because it shows that cognitive appraisals play a critical role in the stress–illness relationship.

**Psychology Matters**

## Cognitive Appraisal of Ambiguous Threats

In the aftermath of 9/11, many of the first responders continued to work on site at the WTC for months after the explosive destruction of the twin towers. When authorities from the Environmental Protection Agency (EPA) and the mayor of New York City announced that the air was safe to breathe, many workers took off their safety masks, which were hot and impaired visibility. But was that "all clear" announcement really accurate? Dust an inch thick covered window frames as far as a mile from the smoldering debris on the "pile" at the WTC. Think about what must have been the fallout from two airliners crashing into and demolishing two 110-story office buildings. What would you expect to find upon close inspection of that site? And what do you imagine was the psychological reason for the upbeat, positive public announcement by the EPA, when on the ground conditions were so unhealthy?



After the collapse of the twin towers on 9/11, many first responders continued to work on site for months without the protection of their safety masks.

Almost a decade later, the *New York Times* (2011) published this report on that "secondary tragedy"—the subsequent health damage to WTC first responders from having been encouraged by government officials that the air was safe to breathe when, in fact, it was lethal to do so.

Scientists have called the dust, smoke and ash unleashed by the destruction of the World Trade Center on Sept. 11, 2001, the greatest acute environmental disaster in New York City history. Fires burning at 1,000 degrees created a toxic plume that clouded lower Manhattan and spread to adjoining areas. The collapsing towers pulverized cement and everything the buildings contained, including some asbestos, while the tremendous pressure of the collapsing floors fused materials together in potentially dangerous combinations that scientists had not seen before.

Officials and medical experts estimate that in all, between 40,000 and 90,000 workers and volunteers spent time on the debris pile and may have been affected in some way by the dust. More than 9,000 workers at ground zero brought lawsuits against 90 government agencies and private companies related to illnesses and injuries they say stemmed from working at the site.

**Were officials deliberately lying, then, when they made the announcement that the air was safe to breathe? What do you think?**

Assuming they were fully cognizant of the dangers that were later discovered could be indicative of a judgment error known as the hindsight bias—similar to Monday-morning quarterbacks' analysis of what went wrong in the previous day's football game. While—with the benefit of hindsight—it may be easy to see the magnitude of the danger that workers faced, officials at the time may have been overwhelmed by a variety of diverse predictions made in the face of a situation they had never before encountered. Similar processes may have been functioning in Japan's official optimistic announcements in the first few days following the 2011 quake, tsunami, and subsequent nuclear breach.

We must also acknowledge the power of cognitive appraisal. To make an effective cognitive appraisal of a situation, we must have a concrete understanding of the nature of the threat. For example, the victims of the 9/11 terrorist attacks indisputably experienced distress, recognizing the specific dangers in which they were immersed. But in the years following the attacks, airplane travelers also felt some distress when the government's color-coded warning system—created to assess terrorist threat level and keep the public informed—announced an increased terrorist threat level just before flying. Curiously, the advisory system created enough public confusion and distress—as well as public distrust about possible political motives for alerts imposed just prior to national elections (Zimbardo, 2004a)—that the system was scrapped in 2011. Here's the point: Uncertainty can add to the perceived stress of a situation. Thus, interpretation, or **cognitive appraisal**, can make the accumulated distress from a series of vague threats evoke essentially the same stress response as a single major traumatic incident.

# Key Question: Who Is Most Vulnerable to Stress?

> **Core Concept 14.3**
>
> **Personality characteristics affect our individual responses to stressful situations and, consequently, the degree to which we are distressed when exposed to potential stressors.**

Why do some people bounce back after severely traumatic experiences such as 9/11 or the death of a loved one, while others are derailed by seemingly minor hassles? As we have seen, the stress we experience is determined not only by the quality and intensity of the stressful situation but also by how we interpret the stressor. In this section, we will focus our attention on the personality characteristics that influence our responses to stressors. A summary of what we will learn is captured in the core concept for this section:

> Personality characteristics affect our individual responses to stressful situations and, consequently, the degree to which we are distressed when exposed to potential stressors.

Before we delve into this fascinating field of study, we want to introduce to you a model of the stress–illness relationship that will serve as our guide for the remainder of this chapter.

Figure 14.10 gives you a visual picture of this model, showing how stressors can lead to stress, which in turn can cause physical and mental illness. Please take a close look at this figure before reading further. See if you can figure out how each set of factors plays into the stress–illness relationship, and select the pop tips to learn more.

Note there are two opportunities for intervention: One lies between stressors and stress, and the other occurs between stress and illness. To put it another way, one set of factors can prevent stressors from causing us to feel stress; similarly, a second set of factors can prevent stress from escalating into physical or mental illness. The first set of factors—those that can intervene in the relationship between stressors and stress—we call **moderators** because they moderate or regulate the impact of stressors on our perceived level of stress. Most of them are variations on the concept of **cognitive appraisal**. In other words, these moderators influence the judgments and interpretations we make of the stressor. It is this set of possible interventions that we explore in this section, beginning with an example.

Consider this scenario: Demetria and Cory are newlyweds planning their life together. They want to buy a home as soon as possible and hope to start a family. They have recently begun to argue about these issues, however, as their outlooks toward their goals differ

**Figure 14.10** How Individual Factors Influence Our Stress Response



**Stressor** → **Stress** → **Illness**

**Moderators**
These personality characteristics reduce the impact of stressors on an individual's stress level:

1. Type A/B Personality
2. Locus of Control
3. Optimism
4. Hardiness
5. Resilience

**Coping Strategies**
These learned skills reduce the impact of perceived stress on physical and mental health:

1. Problem-Focused and Emotion-Focused Coping
2. Cognitive Restructuring
3. Social Comparisons
4. Positive Emotions
5. Finding Meaning

**Positive Lifestyle Choices**
These factors impact both sides of the equation, acting as moderators *and* as coping strategies:

1. Social Support
2. Exercise
3. Nutrition and Diet
4. Sleep and Meditation

markedly. Demetria is optimistic they'll be able to afford the down payment on a home within a year and believes they can achieve this goal as long as they carefully manage their money. Cory is less positive. In his mind, it seems as though every time he gets close to reaching a goal, something gets in the way, and he's sure this will be no different. To him, "what's gonna happen will just happen," and he is afraid they risk disappointment if they get their hopes up about getting the house in a year.

Do you see yourself or someone you know in this example? If the different styles of approaching and perceiving events are longstanding, consistent across situations, and similar to those of others, they could be called personality characteristics. Let's examine their impact on the stressor–stress relationship.

By the end of this section, you will be able to:

**14.5** Relate the type A personality to hostility and heart diseases

**14.6** Compare the health-related outcomes in internals versus externals

**14.7** Evaluate the positive effects of hardiness, optimism, and resilience on stress

# 14.5: Type A Personality and Hostility

**Objective:** Relate the type A personality to hostility and heart diseases

When cardiologists Meyer Friedman and Ray Rosenman (1974) hired an upholsterer to repair furnishings in their waiting room, the upholsterer noticed something the doctors had not: Most of the chairs showed an unusually high degree of wear on the front edges of the seats. When they became aware of this, the doctors wondered whether their patients' heart problems might be related to a certain style of coping with stress—it was as if they were always "on the edge of their seats." The doctors began a series of studies to investigate their hypothesis, and interviews with patients revealed a striking pattern of common behaviors. Impatience, competitiveness, aggressiveness, and hostility—all stress-related responses—were noted again and again. Many also admitted they were notorious workaholics. Friedman and Rosenman ultimately found this collection of attitudes and behaviors not just correlated with heart disease but actually predictive of it. They dubbed it the Type A pattern: Type A men and women were found to have twice as much risk of heart disease as the Type B individual, who takes a relaxed approach to life (Matthews, 1982).

Since the initial identification of the **Type A** personality, careful research has revealed that it is specifically the anger and hostility common in Type A people that increases risk of heart disease. Time urgency, perfectionism, and competitiveness, without the anger and hostility, are not risk factors. Hostile individuals are less trusting, quicker to anger, and more antagonistic than their nonhostile counterparts. If you're noticing a connection to cognitive appraisal, you are right: Hostile people would be more likely than most to perceive threat in a situation. This interpersonal style makes it more difficult to maintain relationships, which in turn reduces availability of social support. Hostility is also associated with a variety of risky health behaviors—such as smoking, drinking alcohol, and overeating—that themselves increase risk of heart disease (Taylor, 2008).

**CAUSES AND CONSEQUENCES OF HOSTILITY**   From a physiological perspective, those high in hostility become aroused more quickly in the face of a potential stressor, exhibit greater levels of arousal, and take more time for their arousal level to return to normal once the stressor has passed (Fredrickson and others, 2000; Guyll & Contrada, 1998). Hostility is also associated with higher levels of **cytokines**, which can prolong the stress response (Niaura and others, 2002). Researchers aren't yet sure, though, whether these biological differences are entirely genetic in nature or partially a result of early childhood environment: Boys who grow up in families rife with conflict and low in acceptance and support are at greater risk to develop hostility (Matthews and others, 1996). At this time, both nature and nurture are thought to play roles in development of hostility and later heart disease. Clearly, though, there are multiple channels through which hostility promotes heart disease.

Let us reassure you that, while many people may sometimes feel angry, there are important differences between normal anger and a truly hostile personality style. We all feel angry at times in response to a negative situation—in these instances, anger can be healthy and even adaptive: It signals us that something is wrong and provides the energy to take measures to correct the situation. That type of normal anger stands in marked contrast to the hostile personality style, which reflects a long-term pattern of hostile behavior that manifests frequently across a variety of situations. The level of arousal is a distinguishing factor as well: It is reasonable to feel irritated when a slow-moving vehicle blocks you in traffic, but feeling enraged is irrational and dangerous, especially if this becomes a common pattern in your life.

Besides cardiovascular diseases, other illnesses have been linked with Type A habits: allergies, head colds, headaches, stomach disorders, and mononucleosis (Suls & Marco, 1990; Suls & Sanders, 1988). Likewise, the perfectionism characteristic of Type A has been linked to anxiety (about reaching impossible goals) and to depression (from failing to reach them; Joiner & Schmidt, 1995).

Understanding the link between hostility and heart disease and between other Type A behaviors and their associated health risks can help in developing more effective disease prevention. Regular aerobic exercise, relaxation training, and even a program aimed at teaching hostile individuals to speak more slowly and quietly have proven effective at reducing risk of heart disease (Taylor, 2008). Comprehensive stress management training may offer some of the most promising benefits, however. One study in particular showed heart attack survivors given stress-management training had half as many heart attacks in the next 3 years as a control group who received no such training (Friedman & Ulmer, 1984). The researchers concluded: "No drug, food, or exercise program ever devised, not even a coronary bypass surgical program, could match the protection against recurrent heart attacks" afforded by learning to manage stress (p. 141). Thus, even though Type A behavior seems to show up early in life and persist into adulthood, well-designed interventions can be effective in helping Type As who are committed to change in their lifestyles. See Table 14.1 for a comparison of key characteristics of Type A and Type B individuals.

**Table 14.1**  Key Characteristics of Type A and Type B Individuals

This table compares key characteristics of Type A and Type B individuals.

| Type A individuals | Type B individuals |
|---|---|
| • Work at an accelerated pace | • Work at a steady pace |
| • May not enjoy achievement | • Typically enjoy achievement |
| • Do not accept failure easily | • Accept failure more readily |
| • Adopt a sense of urgency | • Adopt a laid-back approach |
| • Like to compete | • Prefer to enjoy the experience |

# 14.6:  Locus of Control

**Objective:**  **Compare the health-related outcomes in internals versus externals**

How confident are you that you can make your life turn out pretty much the way you want it to? In our example at the beginning of this section, newlyweds Cory and Demetria were struggling with their differences on this dimension of personality known as **locus of control** (from the Greek *loci*, meaning place), which is a relatively stable pattern of expectations about our ability to influence the outcomes in our life.

- **Internals** (those with an internal locus of control) generally believe that if they take certain action, they are likely to gain the outcome they desire—diligent studying, for example, will result in good grades.
- **Externals**, on the other hand, see an unpredictable relationship between their efforts and their outcomes. They

are more likely to believe that factors outside their control, such as the fairness of the test or how much the professor likes them, will have a decisive effect on their grades—regardless of how much they study.

In the face of a stressful event, internals are more likely to perceive the stressor as manageable than are externals, which leads to lower stress and, ultimately, to a variety of health benefits. And perception of control can, at least to some extent, be learned: Firefighters and other 9/11 personnel who were trained for such disasters experienced lower rates of PTSD in the years following the attacks (Perrin and others, 2007).

## 14.6.1:  Locus of Control, Health, and Longevity

A classic study illuminating the importance of perceived control on health took place in a Connecticut nursing home 30 years ago. Elderly residents on one floor were offered a variety of choices about their daily lives. For example, they were allowed to choose whether and when to watch available movies, how they wanted the furniture and personal items in their rooms arranged, and whether or not to have a plant in their room—which they were responsible for watering. In communications with this group, nursing home staff emphasized the residents' personal responsibility for their own satisfaction; the nursing home staff was happy to help in any way (for example, moving the furniture) on request of a resident. Residents on a different floor, matched on important characteristics such as health and age, acted as the control group. Here the staff took full charge of the residents' care, watering all the plants, assigning movie times, and arranging furniture as per administrative decisions.

The results? After 18 months, the "more responsible" residents were more active, more alert, and happier than the control group. What's more—in an entirely unexpected outcome—locus of control actually affected the residents' life spans. By the end of the study, the mortality rate of the control group was 67% higher than that of the group with increased personal responsibility (Rodin, 1986).

Locus of control impacts a wide range of health-related outcomes. In addition to being more likely to wear seat belts, exercise regularly, and pay attention to their diets—all of which have obvious health benefits—internals have better immune systems than do externals (Chen and others, 2003). They get sick less often and recover more quickly from illnesses and surgeries alike (Skinner, 1996). What's more, a strong sense of internal control actually dissolves the well-documented relationship between social class and health: Low-income individuals who have an internal locus of control are just as healthy as those with higher incomes (Lachman & Weaver, 1998).

## 14.6.2:  Culture Affects Locus of Control

Cultural studies have identified an interesting distinction between perceptions of control in Western and Eastern cultures.

- **Primary control**, prevalent in the West, is the type of control discussed previously: taking action aimed at controlling external events.
- Eastern cultures are more likely to engage in **secondary control**, which emphasizes controlling one's reactions to events (Rothbaum and others, 1982).

A culture's general value system influences the type of control most highly prized and promoted in that culture. In Japan, for example, traditionally a collectivist culture, child-rearing practices encourage development of secondary control. Children are taught to adjust their reactions to a situation to help maintain social harmony. This stands in direct contrast to the individualistic approach to child-rearing, which fosters efforts to control the situation itself. Research indicates that both strategies work well in the context of their respective cultures (Weisz and others, 1984). Furthermore, when efforts at primary control fail or are not possible for an individual, engaging in secondary control improves health.

## 14.6.3:  Is Locus of Control Innate or Learned?

While locus of control does tend to appear early and run in families—factors that often indicate a genetic component—our experiences also impact our expectations. Individuals who repeatedly experience failure when they attempt to escape threatening conditions may simply stop trying, a concept called **learned helplessness**. Evidence of learned helplessness originally came from animal studies performed by Martin Seligman and his colleagues. Dogs receiving inescapable electric shocks soon gave up their attempts to avoid the punishment and passively resigned themselves to their fate (Seligman, 1975, 1991; Seligman & Maier, 1967). Later, when given the opportunity to escape the shocks, the dogs typically did nothing but whimper and accept them. In contrast, a control group of dogs that had not been subjected to previous punishment was quick to escape. Seligman concluded that the experimental group of animals had already learned that nothing they did mattered or altered the consequences, so they passively accepted their fate (Seligman & Maier, 1967).

An experiment by Donald Hiroto (1974) employed human participants in a variation of Seligman's dog research. One at a time, students were placed in a very noisy room; some found a way to turn off the noise, but for others, the noise controls did not work. When the students

were sent to a new room and exposed to a different irritating noise, those who had successfully turned off the noise in the previous room quickly found the simple solution in the second room. In contrast, those who had failed in their efforts to shut off the noise earlier just sat in the new room, making no effort to stop the latest stressor. They had already learned to be helpless. Seligman and other scholars see symptoms of the same learned helplessness syndrome in a variety of human populations, including abused and discouraged children, battered wives, and prisoners of war (Overmier, 2002; Yee and others, 2003). Conversely, workers at all skill levels in a variety of professions report greater well-being when given some measure of control over their environment and working conditions (Faulkner, 2001; Zarit & Pearlin, 2003).

Thus, although we may be born with an individual predisposition to an internal or external locus of control, our experiences play a role as well. Research with 9/11 rescue personnel and regarding learned helplessness are just two areas in which this important fact has been illustrated.

# 14.7: Hardiness, Optimism, and Resilience

**Objective:** Evaluate the positive effects of hardiness, optimism, and resilience on stress

One of the most effective stress moderators is **hardiness**, an outlook based on distinctive attitudes toward stress and how to manage it. In contrast with risky Type A behavior, hardiness is a personality pattern that promotes healthy coping. Hardiness first emerged in a large-scale study of managers working for Illinois Bell Telephone (IBT) in the 1970s and 1980s. Salvatore Maddi and a team of researchers from the University of Chicago gathered extensive data from the managers over a period of years, during which federal deregulation of public utilities resulted in massive layoffs and downsizing of IBT. Working conditions, positions, and expectations changed frequently, creating a highly stressful work environment. Two-thirds of the managers experienced negative health consequences, including heart attacks, strokes, depression, and anxiety disorders. The other third—exposed to the same conditions—not only experienced no ill effects but actually appeared to thrive (Kobasa and others, 1979; Maddi & Kobasa, 1984). The distinguishing factor, it turned out, came to be known as hardiness, a concept comprised of three specific characteristics, now know as the Hardiness Attitudes, or the Three-Cs (Maddi, 2002):

Together, these Hardiness Attitudes provide the courage and motivation to engage in the hard work of turning stresses to advantage. Let's apply these hardiness factors to the life of a college student. Suppose that on the day you must prepare for a major test, a friend confides in you about a terrible problem and begs for your help. These two stressors—an important test and a needy friend—could be overwhelming, especially if you are already stretching some of your resources to the limit. But a hardy individual would employ the "three Cs" to reduce the stress of the situation: commitment ("I'm committed to my friend and to preparing for this test; I'm not going to let either one down"); challenge ("Now I have two important things I need to do—what are my options for meeting both needs?"); and control ("I'll study all afternoon, talk to my friend over dinner—after all, I have to eat to keep my brain functioning—then review more before bed").

Hardiness has been shown to reduce the effects of stressful situations across a wide variety of populations: in businesspeople, children, couples, college students, Olympic athletes, military, and law enforcement (Maddi, 2002). And—like locus of control—although some indications of a hardy personality show up early in life, hardiness can also be learned. Researchers have successfully developed hardiness-training programs that help individuals learn more adaptive ways of reacting to stressors in their life, by problem-solving (rather than avoidance), coping, socially supportive (rather than conflictful) interactions, and beneficial (rather than overindulgent) self-care. This process

**Figure 14.11** The 3 Cs of Hardiness

### The 3 C's of HARDINESS

| CONTROL | Hardy persons have an internal locus of control and are good at problem solving—that is, they have not become victims of learned helplessness. |
| --- | --- |
| COMMITMENT | Hardy individuals become highly engaged in their lives, demonstrating a focused commitment to involvement in purposeful activity. |
| CHALLENGE | Hardy people perceive life's changes as a challenge to be overcome and an opportunity to learn and grow—rather than as a threat. |

deepens their Hardiness Attitudes and enhances their performance, conduct, motivation, and health (see Beasley and others, 2003; Maddi, 1987, 2002; Maddi and others, 1998; Maddi and others, 2009).

## 14.7.1: Optimism

When you think about your future, do you generally expect good things to happen, or do you worry about all the things that could go wrong? Optimists see a future of bright possibilities; for them, "the glass is half full," whereas pessimists are far less positive, instead "seeing the glass as half-empty." And pessimism isn't simply a case of learned helplessness. "Life inflicts the same setbacks and tragedies on the optimist as on the pessimist," says psychologist Martin Seligman (1991), "but the optimist weathers them better." In general, optimistic people have fewer physical symptoms of illness, recover more quickly from certain disorders, are healthier, and live longer than pessimists do (Bennett & Elliott, 2002; Taylor and others, 2000a). What accounts for the differences? **Optimism** has a direct impact on health in that optimists feel more positive emotions, which in turn boosts their immune systems (Cohen and others, 2003). In addition, optimism aids in coping with stress via more active coping strategies, which we will discuss in the last section of this chapter.

A long-term research program by Seligman (2002) and associates indicates that an optimistic style of thinking makes three particular assumptions, or attributions, about negative events:

**Table 14.2** Optimists Make Certain Attributions About Negative Events

| Dimensions | Attributions | Examples |
|---|---|---|
| Cause = Specific vs. Global | Problems are seen as isolated events, rather than a symptom of a broad trend. | *"I got a low grade on my last psychology test,"* instead of *"I'm doing badly in school."* |
| Problem = Situational vs. Dispositional | Problems are seen as situational, rather than the result of a personal, internal problem. | *"It probably happened because I missed class the day before the exam when the professor gave a review session,"* rather than *"I'm not smart enough to do well."* |
| Duration = Temporary vs. Permanent | Problems are seen as temporary rather than permanent. | *"If I'm careful not to miss class anymore, I'll do better on the next test,"* rather than *"I won't be able to recover from this low score."* |

Seligman, one of the founders of the International Positive Psychology Association, believes that an optimistic thinking style can be learned. One way to do so, he advises, is by talking to yourself in a particular way when feeling depressed or helpless. Positive self-talk, says Seligman,

should concentrate on the meaning and causes of personal setbacks. For example, if a person on a diet splurges on a piece of dessert, instead of thinking, *"Because I've ruined my whole diet, I might as well eat the whole cake!"* she or he should think, *"Well, I enjoyed that, but I know I'm strong enough to stick to this diet most of the time."* In essence, Seligman argues that optimism is learned by adopting a constructive style of thinking, self-assessment, and behavioral planning.

In considering this, you might be reminded of the importance of cognitive appraisal in our stress response and of our problem for this chapter concerning individual variations in the stress response. Learning to think more optimistically, or to respond with greater hardiness, changes our interpretation of a potential stressor and, thus, lowers our perceived stress.

## 14.7.2: Resilience

Actress Christina Applegate would seem to have a charmed life for her chosen profession. Born in Hollywood, California (1971), to an actress/singer mother and father who was a record producer, this beautiful, talented young woman went on to be the lead or supporting actress in dozens of films, television programs and Broadway stage shows. Winning numerous awards for her acting, with a popular fan base, she also hosted *Saturday Night Live* and was top of the list of the Most Beautiful People in 2009 of *People Magazine*.

Beneath that public surface is a life filled with many sources of extreme stress. Her parents divorced soon after her birth. She divorced her first husband a few years after their marriage. Her close friend and former boyfriend died of an apparent drug overdose. The next month, Applegate discovered she had breast cancer that was treated with a double mastectomy operation. Early detection saved her now cancer-free life. How did she deal with the knowledge that she, like her mother before her, had developed cancer? She is reported to have said after her initial diagnosis: "I was just shaking and—and then also immediately, I had to go into 'take-care-of-business-mode.'" In an interview with *USMagazine.com* (2010), Applegate also said she has turned her life around in response to that life-threatening disease. "Right away, you kind of go gung-ho—you don't let any stress in your life, you don't eat any crap (food), you do a total 180 from where you were. You look at life a little bit differently." She has now dedicated herself to raising money for cancer research and treatment through her charitable foundation Right Action for Women.

Christina Applegate's life has been filled with successes and setbacks. Is luck at work here? Psychologists recognize in Applegate's decisions, attitudes, and behavior something more precious to well-being than either talent or genius: **resilience**.

Resilience is the capacity to adapt and achieve well-being in spite of serious threats to children's development

(Masten, 2001). In fact, the word *resilience* comes from a Latin root meaning "buoyant"—literally bouncing amid waves. For more than two decades, most resilience research has focused on this quality in children and adolescents who have dealt with stressful life conditions, including parental neglect or abuse, parental mental illness, bereavement, and other serious risk factors. How could some at-risk children survive and even thrive when others became ill and failed *because* of the same types of risks?

**RESILIENCE: NATURE OR NURTURE?**    Even at young ages, resilient children are distinguished by an assortment of qualities. They tend to have higher cognitive abilities, greater conscientiousness, better social skills, greater competence, and access to better caregiving or parenting resources (Masten, 2001; Riolli, 2002). Identifying resilient qualities so early in life supports the inference that one is either born resilient or not—it is an innate human quality. More recently, however, attention has been focused on the quality of resilience among adult populations and also on whether resilience can be learned.

One study of resilience among adults examined survivors of the 1999 conflict in Kosovo in the former Yugoslavia. Resilience was related to a combination of personality traits, including extraversion, conscientiousness, and optimism (Riolli, 2002). Of these, optimism in particular holds promise for helping people to become more resilient and less vulnerable or brittle. Also, you may have noticed that resilience seems to overlap somewhat with hardiness, and indeed the two concepts are related. While hardiness is focused on three specific characteristics, though, resilience encompasses a broader range of qualities. And, because hardiness can be developed with the help of specific training programs, perhaps the future will bring similar findings to resilience.

Psychologist George Bonanno of Columbia University is a pioneering figure in the field of bereavement and trauma. His extensive longitudinal and interview research on survivors of all sorts of extremely stressful experiences—from children to adults, in personal loss and major catastrophes—leads to the conclusion that "The ability to rebound remains the norm throughout adult life" (Bonanno, 2009). Based on his research, Bonanno finds that resilience and recovery are far more common than chronic dysfunction or delayed trauma. It fair to infer that many of those people who don't cope well with new stressors are those who were already highly stressed, and then experienced another stressor in their lives—thus, they were in Stage 2 of the GAS.

More detail about Bonanno's findings can be found in Table 14.3.

Bonanno also coined the term *coping ugly* to refer to a variety of coping strategies that are helpful in stressful situations but might be inappropriate in normal circumstances. Among them are: self-enhancement biases, ego boosting, laughing and smiling, thought suppression, beliefs in per-

**Table 14.3** Bonanno's Trajectories of Psychological Functioning

| Trajectory Type | Description | Category |
|---|---|---|
| Resilience | Adults experiencing a disruptive event (e.g., death of loved one or other trauma) can maintain relatively healthy levels of psychological and physical functioning and capacity for positive emotion. | Common |
| Recovery | Normal functioning temporarily gives way to psychological distress (e.g., symptoms of depression or PTSD) for several months or more, then gradually returns to pre-event levels. | Common |
| Chronic Dysfunction | Prolonged suffering and inability to function, usually lasting several years or longer. | Rare |
| Delayed Grief or Trauma | When adjustments seems normal at first, but distress and symptoms increase months later. Researchers have not found evidence of delayed grief, but delayed trauma appears to be a genuine phenomenon. | Rare |

sonal mastery to survive no matter what, and others. His main point is that most of us survive anything and everything surprising well, and we do so using a range of personally invented strategies. It is a testimony to our human adaptiveness under almost all challenges. (Bonanno & Mancini, 2008).

Resilience, then, need not be rare. In fact, many everyday heroes and "unknown celebrities" overcome terrible difficulties without our awareness. Their ability to deal with pain and challenge is actually the result not of extraordinary forces but of *ordinary magic*. It is the term that resilience researcher Ann Masten (2001) uses for normal adaptation processes, which, she argues, make people capable of greater outcomes than we might expect. By expecting more, perhaps we take a step toward greater optimism and resilience in our own lives.

**Psychology Matters**

# Using Psychology to Learn Psychology

Imagine you have just suffered a loss: a friend picked a fight and insulted you, violating your sense of trust; the one you love doesn't return your feelings and has rejected you; or your family pet has died, leaving you grief-stricken though friends insist you should "get over it." Whatever the stress, you aren't sure where to go or to whom you can talk—yet you feel a strong need to express your thoughts and feelings. What can you do? Here's a place to start: Write it out. In the process, you'll learn more about your own psychology.

Why write? Why not just rant and rave and get it out of your system? For one thing, aggressively venting emotions is not enough to relieve stress or support your health; on the contrary, it can even have aggravating or harmful effects (Gross & Psaki,

2004; Smythe, 1998). Conversely, writing about your fears and losses has therapeutic emotional effects (Pennebaker, 1990, 1997; Zimmerman, 2002), and writing about feelings and worries has been found to support the health of patients with immune disorders (Pennebaker, 1997). When you write out your thoughts and feelings, you talk only to and for yourself. With no audience to perform for and no patient listener to please, you can use frank language, tell all, and rest assured you don't have to explain anything. All you need is a place, a time, the materials you need, and commitment to maintain the habit. There are several ways to make the practice easier and more effective:

- Write in any medium that is efficient or comforting to you—it's OK to type at your keyboard, but you may not always have convenient access to your computer. Handwriting is more personally expressive, and you don't have to make it legible—it's for your eyes only. By using a pen and paper, you cannot only write but draw or doodle, expressing yourself nonverbally. And a small notebook is inexpensive and easy to keep handy.

- Choose a topic or theme to get you started. If a loss or fear has prompted your writing exercise, start with that. If not, choose an "assignment" that prompts emotions and ideas about important challenges in your life. One professor asks students in a class on psychology of loss to develop a journal of loss, referring either to personal losses or to memorable events such as a terrorist attack or the death of a celebrity and what that has meant to the writer (Harvey & Hofmann, 2001).

- Write out your thoughts as well as your feelings. Focus on finding the meaning in difficult experiences. You may not know the answers (*"Why didn't our relationship last?"*), but you can reason and fantasize (*"Maybe this is a good time for me to be on my own anyway"*). An important purpose in therapeutic writing or talking is to achieve insight, growth, and change. It may also help to write out memories as if telling a story: with a beginning, middle, and end; descriptions of characters and events; and your own conclusions about the "moral of the story" and lessons you have learned (Harvey and others, 1990; Murray, 2002).

- Write in spare moments, setting a goal such as a few pages every week. Write as if you were a reporter, including whatever details seem important (DeSalvo, 2000). Experiment with various forms, such as writing love or hate letters. Identify blessings in disguise or categorize various things you do (e.g., things you do for others versus things you do for yourself; Zimmerman, 2002).

- Stick with it. Make writing a habit, not just a release for the bad times. One researcher found that writing only about trauma intensified the pain and left subjects less able to open up or work it through. So even at times when you don't "need" to write, write a few lines anyway—*because* you feel fine—so you can later remember that you have felt good and remind yourself how you got that way!

Your goal in writing is not to become a great writer (though it's possible!) but to work through your stress, learn about your responses and coping patterns, and heal. You set the goals, you make the rules. In doing so, you might consider how to incorporate some of what you have learned in this section about perceptions and hardiness. Perhaps, through writing, we can focus on improving our abilities to perceive stressors in an adaptive manner. In addition, remember our discussion in the first core concept of this chapter about the importance of narratives. But don't let it stress you out! Issue these writing "assignments" to yourself, so you can relax knowing there is no deadline pressure and no grade to worry about.

# Key Question: How Can We Transform Negative Stress into Positive Life Strategies?

> ### Core Concept 14.4
> **Effective coping strategies reduce the negative impact of stress on our health, while positive lifestyle choices can enhance our mental and physical health as well as our overall well-being.**

Is it possible to choose to live a long and healthy life? Or will your health be determined by factors out of your hands, such as your genetic background or your access to health care? After exposure to a traumatic stressor such as an earthquake or death of a loved one, or a chronic stressor such as an excessive workload in one's job, is there something we can do to reduce its impact on our health?

By now, you've probably gathered that taking a hardy approach to these questions, with an internal **locus of control** and an optimistic attitude, will increase your odds of success! And there is more good news: Illness and mortality can also be affected by the coping strategies we employ and the lifestyle choices we make (Elliott & Eisdorfer, 1982; Taylor, 2009). As you can see by "reading between the lines" in Table 14.4, many "early deaths"

**Table 14.4**  Twelve Leading Causes of Death, Number per Year

1. Heart disease: 616,067/year
2. Cancer: 562,875
3. Stroke (cerebrovascular diseases): 135,952
4. Chronic lower respiratory diseases: 127,924
5. Accidents (unintentional injuries): 123,706
6. Alzheimer's disease: 74,632
7. Diabetes: 71,382
8. Influenza and pneumonia: 52,717
9. Nephritis, nephrotic syndrome, and nephrosis (kidneys): 46,448
10. Septicemia (bacterial infections): 34,828
11. Intentional self-harm (suicide): 34,598
12. Assault (homicide): 18,361

Note: In 2007, a total of 23,199 persons died of alcohol-induced causes in the United States. The age-adjusted death rate for alcohol-induced causes for males was 3.2 times the rate for females, because men drink alcohol both more often and in greater amounts (of excess).

result from behaviors over which we do have some degree of personal control. Early deaths are those that are years before standard age-graded estimates by gender or occupation. Stress, of course, is part of the lifestyle equation, too.

In this section of the chapter, we will explore effective ways of coping with stress, as well as lifestyle choices that can help ward off the devastating effects of stress through better health. As our the core concept puts it:

> Effective coping strategies reduce the negative impact of stress on our health, while positive lifestyle choices can enhance our mental and physical health as well as our overall well-being.

**Coping strategies** work by reducing the impact of stress—once we're feeling it—on our health. In other words, they decrease the effects of stress on our bodies. **Positive lifestyle choices** have the same power to help us cope effectively with stress and have an added benefit: They also act as stress moderators, diminishing the stress we perceive when exposed to stressors. That is, positive lifestyle choices increase our resistance to stress as well as our resistance to illness. Take another look at Figure 14.10 to see again how all these components of the stress–illness puzzle fit together. We begin this section of the chapter by examining coping strategies that are most useful in combating stress. Then, we examine the lifestyle choices associated with stress reduction and disease prevention. Finally, we will look at the characteristics of people who say they have found happiness and a sense of well-being.

By the end of this section, you will be able to:

**14.8**    **Describe a variety of effective coping strategies**

**14.9**    **Explain the health benefits of various positive lifestyle choices**

**14.10**   **Evaluate the concept of subjective well-being or SWB**

# 14.8:  Psychological Coping Strategies

**Objective:**    **Describe a variety of effective coping strategies**

We know that the **Type A** personality, pessimism, and **learned helplessness** can aggravate the stress response, just as **hardiness**, optimism, an internal **locus of control**, and **resilience** can moderate it. (See Table 14.3 for a reminder.) Certainly, we advise that for serious stressors and difficulties, you seek out professional advice and help. (If you don't know a psychotherapist or licensed counselor, ask a trusted instructor or health care provider

for a referral.) What can you do on your own, however, to cope effectively with stress? And what exactly is meant by coping?

## 14.8.1:  Defending Versus Coping

There are two broad categories of stress management behaviors: defending and coping.

1. **Defending** involves reducing the symptoms of stress or reducing one's awareness of them. For example, if you feel stress over an important psychology exam for which you feel unprepared, you might simply defend against that anxious feeling by distracting yourself with some activity that is fun— going to a party or visiting friends. Your defense won't make the problem go away—there will still be an exam, and now you'll be even less prepared for it! But for a brief period, you might feel less stress. Defending has the advantage of alleviating some symptoms like worry, discomfort, or pain; but it has the serious drawback of failing to deal with the stressor. Inevitably stress returns, only now it may be more difficult to alleviate.

2. In contrast with merely defending against stress, healthy **coping** involves taking action that reduces or eliminates the causes of stress, not merely its symptoms. To cope, you must confront the stress, identify the stressor, and develop a way of solving the problem or reducing the harm it causes you. This means not just feeling better but improving the entire stressful situation. To cope with stress over a looming psychology exam, you must:

   a.  Realize you feel unprepared for the exam

   b.  Identify effective strategies to study for the test

   c.  Implement the strategies in a timely manner

   d.  Take the test

   This way you will not only feel prepared, you will be prepared and feel less anxious. Of course, you may have to postpone having fun until after the exam, but you'll enjoy yourself more without the test anxiety.

## 14.8.2:  Problem-Focused and Emotion-Focused Coping

In general, there are two basic approaches to healthy coping: emotion-focused coping and problem-focused coping.

1. **Problem-focused coping** involves clarifying the stressor and taking action to resolve it. This may involve some advance planning, such as when you are

**Table 14.5** Positive and Negative Coping Strategies

| | Positive coping strategies | Negative coping strategies |
|---|---|---|
| **Problem-focused** | • Time Management: Set priorities. Balance use of time.<br>• Goal Setting: Plan what you want to happen.<br>• Assertiveness: Tell people what you need. Say no with respect. | • Procrastination: Ignore priorities. Waste time.<br>• Passivity: Wait to see what happens.<br>• Aggressiveness: Shout or swear without saying what you need. |
| **Emotion-focused** | • Exercise: Jog. Go to the gym.<br>• Self-care: Rest. Eat healthy. Take a bath.<br>• Engagement: Talk to a friend. Go to a social event. | • Inactivity: Lie in bed or sit around for days.<br>• Self-abuse: Binge. Purge. Starve yourself. Stop showering. Abuse drugs.<br>• Disengagement: Withdraw from others. |

nervous about starting classes at a new school. Problem-focused coping in that situation could involve a visit to the school to figure out where your classes are and to talk with an academic advisor to get some tips for success, thus reducing your anxiety about knowing your way around and about being able to do well.

2. **Emotion-focused coping**, on the other hand, involves efforts to regulate your emotional response to the stressor by identifying your feelings, focusing on them, and working through them. Effective emotion-focused coping must be distinguished from *rumination*, which is dwelling on negative thoughts (rather than emotions); not surprisingly, rumination has been found to compromise our immune systems (Thomsen and others, 2004)—and it doesn't help us feel better either!

Both types of coping can be useful. In general, problem-focused coping is best when there is some concrete action that can be taken to reduce the stressor. In contrast, emotion-focused coping can help at times when you must simply accept a situation or when you need to work through your emotions before you can think clearly enough to act rationally (Folkman & Lazarus, 1980; Zakowski and others, 2001).

Sometimes, the two coping styles work best together. For example, if you get fired from your job, you might start looking for another job (problem-focused) but find you can't focus on the task because you are too angry and confused about being fired. In that type of situation, try some emotion-focused coping to help yourself calm down and think more clearly. You might go for a run or to the gym, talk to a trusted friend, write in your journal, or engage in some other task that helps you work through your feelings. Alternatively, you might take a hot bath, get some rest, or eat something nourishing. Such emotion-focused coping is not merely a defense (as in distracting yourself completely from the problem). Rather, it focuses on processing your emotional responses before they career out of control and become hazardous to your health. Then, when you feel calm and prepared, you can concentrate on what it takes to address the stressor and solve the problem.

Whether the coping strategies are problem-focused or emotion-focused, it's important to remember that strategies can be positive or negative. Review the various coping strategies in Table 14.5. Identify those that you have used in the past and those that you want to use in the future.

## 14.8.3: Cognitive Restructuring

**Cognitive appraisal** plays a role in the stress–illness relationship. And while the personality factors that make us less vulnerable to stress—such as hardiness and locus of control—are deeply ingrained in our general outlook, with a little conscious effort, we can apply their basic principles to our coping efforts (Kohn & Smith, 2003). **Cognitive restructuring** involves just that: cognitively reappraising stressors with the goal of seeing them from a less-stressful perspective (Meichenbaum & Cameron, 1974; Swets & Bjork, 1990). The approach involves recognizing the thoughts you have about the stressor that are causing anxiety, then challenging yourself to see the situation in a more balanced or realistic manner. Getting fired, for example, offers the opportunity to find a new job that is more enjoyable, offers better pay, or has more potential for advancement. Cognitive restructuring is especially suitable for people experiencing chronic stress. Indeed, it is one of the cornerstones of cognitive–behavioral therapy, which we discussed in the previous chapter. This approach is more than just putting on a happy face; it puts people into a constructive problem-solving mode that facilitates effective action strategies.

Making **social comparisons** is a type of cognitive restructuring that specifically compares your own situation to others in similar situations. Health psychologist Shelley Taylor (1983) first noted the use of social comparison in a study of breast cancer patients.

• Some of them engaged in **downward social comparison**, in which they compared their own situations to those of women worse off than they were, which in turn helped them see their illness in a more positive light. (Please note that, in making these downward comparisons, no one is taking pleasure in others' pain;

the strategy is simply noticing and acknowledging the existence of grimmer possibilities.)

- Others engaged in **upward social comparison** and used breast cancer patients who were doing better than they were as models and inspiration for improvement.

Corroborating research has demonstrated that both types are effective coping strategies. In a sense, downward social comparisons represent a type of emotion-focused coping—in that the comparison ultimately makes you feel less worried—whereas upward comparisons are a type of problem-focused coping because the models serve as a guide for specific action (Wills, 1991).

## 14.8.4:  Positive Emotions

If negative thinking and negative emotions such as hostility are stress inducing, then is the opposite true as well: Are positive emotions health inducing? Several areas of study indicate they may be.

One study investigated this question in a group of Catholic nuns who ranged in age from 75 to 95 years. Researchers gained access to autobiographies the nuns had written just prior to entering the convent (when most were in their early 20s) and measured the emotional content of the writings. Each one-page autobiography was rated for the number of positive, negative, and neutral emotional words used. Clear differences emerged: Nuns who used the most positive-emotion words lived an average of 9.4 years longer than those who expressed the fewest positive emotions! Moreover, expressing a wider variety of positive emotions in their autobiographies increased life span by an additional year (Danner and others, 2001).



The classic study of nuns illustrates the importance of positive emotions in health and longevity. Feeling and expressing positive emotions can actually lengthen your life span.

Cultivating and expressing a sense of humor also buffers the effects of stress. The ability to find something to laugh about during exposure to a stressor not only improves mood but also decreases the physiological impact of the stressor (Dillard, 2007). Having a good sense of humor, as a personality characteristic, also appears to reduce an individual's cognitive appraisal of

a stressor (Kuiper and others, 1993; Lefcourt, 2000). These findings dovetail with work by Harvard psychologist George Vaillant, whose life-span study of men noted joy in living as one of the key predictors of health and long life (Vaillant, 1990).

If you don't possess a naturally good sense of humor or don't characteristically experience a lot of positive emotions, you can still benefit from these tools in your coping efforts. Making a conscious effort to note positive moments in your life and to seek out situations in which you find humor and joy can and will improve your life, says positive psychology proponent Martin Seligman in his book *Authentic Happiness* (2002). A poignant expression of this was noted by an AIDS patient, who said this:

> Everyone dies sooner or later. I have been appreciating how beautiful the Earth is, flowers, and the things I like. I used to go around ignoring all those things. Now I stop to try and smell the roses more often, and just do pleasurable things. (G. M. Reed, cited in Taylor, 1999)

## 14.8.5:  Finding Meaning

Viktor Frankl was a well-respected neurologist in Austria when Nazi forces deported him and his family to a concentration camp. They, along with thousands of other Jews, were subjected to various forms of deprivation, torture, and unspeakable atrocities, and many—including Frankl's wife and parents—died in the camps. Frankl, however, survived, and after the war ended, he made a significant contribution to the field of psychology with his work on the importance of finding meaning in seemingly inexplicable events such as what he had experienced in the camps. In his seminal work, *Man's Search for Meaning* (Frankl, 1959), he says, "When we are no longer able to change a situation—just think of an incurable disease such as inoperable cancer—we are challenged to change ourselves."

Frankl's hypothesis spawned research investigating the benefit of finding meaning in loss, which has identified two specific types of meaning, **sense making** and **benefit finding**. Following a significant negative life event, people try to make sense of the event in some way so it fits our perception of the world as predictable, controllable, and nonrandom (Tait & Silver, 1989; Tedeschi & Calhoun, 1996). For example, a death might be explained as inevitable if the person had been battling a long illness or if he or she had a history of heavy smoking. In the wake of Hurricane Katrina, discussions of longstanding problems with New Orleans' levees reflected a similar attempt for sense making. Individuals with strong religious beliefs may make sense of loss by attributing it to God's will. A second path to finding meaning lies in recognizing some

benefit that ultimately came from the loss, such as a renewed sense of appreciation for life or other loved ones, or discovery of a new path in life.

Successful coping appears to involve both sense making and benefit finding, although at different times. Sense making is the first task people struggle with, but ultimately working through the loss and regaining momentum in life seems to hinge on resolving this first question and moving on to the second (Janoff-Bulman & Frantz, 1997). This may explain why people who have lost a child, individuals coping with an accidental or violent death of a loved one, and others dealing with a loss that defies our perception of the natural order of life often have a harder time recovering from the loss (Davis and others, 1998).

Finding meaning in tragedy, then, is not an easy task. Is there anything that can help? Not surprisingly, perhaps, optimists have an easier time of it than do pessimists, especially with regard to benefit finding (Park and others, 1996). Strong religious beliefs appear to facilitate sense making, particularly with the loss of a child, as evidenced in a study of parents who had lost a child to sudden infant death syndrome (SIDS; McIntosh and others, 1993). And the benefits of social support—which we will explore shortly—are not limited to a particular personality type or to the religious but can play an important role in finding meaning of both types.

## 14.8.6:  Psychological Debriefing: Help or Hindrance?

On April 20, 1999, two heavily armed students at Columbine High School in Littleton, Colorado, carried out a planned massacre, fatally gunning down 12 students and a teacher before turning their guns on themselves. Those who survived needed help coping, but so did their horrified loved ones and the larger community. Although the vast majority of trauma survivors recover from early trauma without professional help, community leaders and mental health professionals may initiate counseling sessions—seeking out individuals or gathering groups in meeting spaces—in hopes of reducing posttraumatic stress. After the Columbine massacre, counselors visited all classes regardless of whether individual students had reported problems. Similarly, after the World Trade Center attacks, a program was funded to offer free counseling for New Yorkers—but only a fraction of the predicted number sought help, leaving $90 million in therapy funds unspent (Gittrich, 2003). Don't survivors want help—or isn't such help very effective?

This form of crisis intervention, called **psychological debriefing**, is a brief, immediate type of treatment focusing on venting emotions and discussing reactions to the trauma (McNally and others, 2003). This practice is based on the assumption that it is psychologically healthier to express negative feelings than to keep them inside. This belief, in turn, is based on the ancient concept of **catharsis**, which involves relieving emotional "pressure" by expressing feelings either directly (as by expressing them verbally or hitting a punching bag) or indirectly (as by watching a violent play or movie). Unfortunately, the theory of catharsis doesn't hold up to empirical scrutiny—rather than reducing arousal and feelings of distress, studies show it often prolongs them. So, for individuals who want counseling or emotional support, these services can be helpful, but it is faulty thinking to believe that venting in the traditional sense is healthy, or that everyone needs to "talk it out." Thus, requiring them can be counterproductive.

**CRITICAL INCIDENT STRESS DEBRIEFING (CISD)** Recently, a specific type of psychological debriefing known as **critical incident stress debriefing (CISD)** has emerged and taken center stage in the field of psychological debriefing. CISD programs typically offer group sessions to trauma survivors within 72 hours of the traumatic event; these sessions are 2 to 3 hours long and often mandated by organizations (such as by Columbine High School in the aftermath of the shooting, and also in many police and fire departments). CISD programs follow a strict agenda that requires participants to first describe the facts of the traumatic event, then recount the immediate cognitive reactions they had to it, followed by their feelings and any symptoms of psychological distress they have begun to notice as a result. Next, program leaders offer information about frequently occurring symptoms and provide referrals for follow-up treatment. This is a commercial program that requires users to pay a fee to the CISD originators in order to employ these tactics.

**IS CISD EFFECTIVE?**  Does it really work as advertised? As we have learned, extraordinary claims require extraordinary evidence. Also, remember that we are biased when it comes to emotionally charged topics—our strong desire to find a "cure" can interfere with our ability to think critically about the evidence. In cases like this, it is all too easy to jump on the bandwagon of an exciting new treatment before it has been soundly tested. And while proponents of CISD argue for its effectiveness, very few studies have followed sound methodological procedures to accurately measure the outcomes (Devilly and others, 2006). On the contrary, some trauma experts are cautioning that the procedures of CISD can actually strengthen the memory of a traumatic experience—the opposite of helpful intervention. Moreover, the procedures involved in CISD run contrary to some long-established findings regarding the ineffectiveness of catharsis, which casts further doubt on the true efficacy of the program. The initial skepticism of your

authors about this technique has been justified by several systematic evaluations, which have concluded that there is no value to trauma survivors of such critical stress debriefing (Beverley and others, 1995; McNally and others, 2003).

One comprehensive survey of the effects of such techniques on first responders to the World Trade Center terrorist disaster concludes:

> Psychological debriefing—the most widely used method—has undergone increasing empirical scrutiny, and the results have been disappointing. Although the majority of debriefed survivors describe the experience as helpful, there is no convincing evidence that debriefing reduces the incidence of PTSD, and some controlled studies suggest that it may impede natural recovery from trauma (McNally and others, 2003, p. 45).

Cognitive and behavioral therapies that focus on cognitive reappraisal and use well-established procedures to reduce emotional arousal associated with the event may be more effective than CISD, especially when therapy is delivered not immediately but many weeks after the traumatic event (McNally and others, 2003).

In summary, then, these are the coping strategies found to be effective in keeping stress from taking a toll on our health: problem-focused and emotion-focused coping, cognitive restructuring, upward and downward social comparisons, positive emotions, and finding meaning. Each of these factors offers an additional clue to help us understand individual differences in how stress affects us. As you consider your own use of these tools, please remember two things:

1. First, people facing chronic stressors often rely on a combination of strategies.
2. Second, there are also a number of lifestyle choices we can add to our "coping strategies toolbox" and gain the added benefit of moderating stress as well.

We turn our attention next to a review of those factors.

# 14.9: Positive Lifestyle Choices: A "Two-for-One" Benefit to Your Health

**Objective:** **Explain the health benefits of various positive lifestyle choices.**

If you are like most people, you like a bargain! We want the most for our money, the most for our time, and the most for our efforts. The positive lifestyle choices we will discuss in this section are bargains for your health, in

that each investment you make in this category gives you not one but two benefits: These choices act both as moderators and as coping strategies (see Figure 14.11). The more of these you integrate into your life, the better health you will enjoy. Let's start with a little help from our friends.

## 14.9.1: Social Support

One of the best antidotes for stress is **social support**: the psychological and physical resources others provide to help an individual cope with adversity. Research shows that people who encounter major life stresses, such as the loss of a spouse or job, experience fewer physical and psychological ailments if they have an effective network of friends or family for social support (Billings & Moos, 1985). They are less likely to contract colds and have less risk of depression or anxiety. Similarly, social support has demonstrable health benefits for those with physical disease (Davison and others, 2000; Kelley and others, 1997): Individuals diagnosed with conditions including heart disease, cancer, arthritis, and diabetes all recover more quickly with a good social support network (Taylor, 2006). By contrast, people with few close relationships die younger, on average, than people with good social support networks (Berkman & Syme, 1979; Pilisuk & Parks, 1986)—even when other factors known to affect life span, such as health and socioeconomic status, are controlled for. Remarkably, the lack of a reliable support network increases the risk of dying from disease, suicide, or accidents by about the same percentage as does smoking (House and others, 1988).



These women are doing two things to improve their health: spending time with friends, in a social-emotional network, and laughing. Men tend not to have such social-emotional networks.

**BENEFITS OF SOCIAL SUPPORT** What is it about social support that gives it such power to enhance our health? Research has revealed three specific benefits.

1. *Emotional support* may be what immediately comes to mind when you think of social support, and this indeed is one of its benefits. Having trusted friends and loved ones we can count on during difficult times lends immeasurable relief.

2. *Tangible assistance* comes in the form of specific, task-oriented help, such as rides to the doctor's office or hospital, help with house cleaning, or cooking meals.

3. Finally, *informational support* aims to help an individual better understand the nature of the stressor as well as available resources to cope with it.

In the aftermath of a serious auto accident, for example, someone with spinal cord injuries might benefit from information regarding a typical timeline and strategies for recovery but not be mobile enough to get to a computer to research it. A friend can help. And even though social support networks often consist of family and close friends, support groups or other community resources can provide these benefits as well.

Physiologically, social support reduces the intensity and the duration of the arousal associated with the **fight-or-flight response**. This finding has emerged from experimental studies that first expose participants to a stressor, then measure such responses as their heart rate, blood pressure, and levels of stress hormones either in the presence of social support or alone (Christenfeld and others, 1997). Social support in the form of a friend or loved one provides optimal benefits, but arousal is also reduced when the support comes from a stranger, a video (Thorsteinsson and others, 1998), or even a pet—although dogs somewhat outperform cats in this regard (Allen and others, 2002). And when social support is not present, simply thinking about loved ones even provides some benefit (Broadwell & Light, 1999).

Physical affection, such as hugs, hand holding, and touch, helps combat stress as well. Several studies note lower arousal in women exposed to a stressor when their partners held their hand or gave them a hug—and, recently, this effect was found in men as well (Coan and others, 2006; Light and others, 2005). For both sexes, as in animals, physical contact with a trusted partner raises oxytocin levels, which decreases anxiety and stress. These findings fit nicely with the tend-and-befriend model we introduced earlier in this chapter.

**SUPPORTERS REAP WHAT THEY SOW**  What impact does social support have on the supporter? People in need of social support sometimes worry they might raise their loved ones' stress levels by asking for help. And while this does sometimes occur—caregivers of Alzheimer's patients, for example, show greater risk of depression and disease—overall, support givers benefit from helping. In fact, one study of married couples measured amounts of support giving and receiving over a 5-year period and found that those who provided more support lived longer (Brown and others, 2003). It is important to note, however, that supporters need support as well.

## 14.9.2:  Nutrition and Diet

Good health and the ability to cope effectively with stress require a brain that has the nutrients it needs to function well. Fortunately, a balanced diet can provide all the nutrients necessary to accurately appraise potential stressors from a cognitive perspective. When we fuel ourselves with complex carbohydrates instead of simple sugars, for example, we metabolize the nutrients at a more stable pace, which may help keep us from overreacting. Many people, however, grab a fast-food meal or a candy bar instead of taking time for good nutrition. For example, a survey of students in 21 European countries revealed that only about half attempt to follow healthy eating practices. The same study found that women were more likely than men to be conscious of good nutrition (Wardle and others, 1997).

When chronic nutritional deficiencies occur in childhood—when the brain is growing fastest—development can be retarded (Stock & Smythe, 1963; Wurtman, 1982). Poor nutrition can have adverse effects on adults, too. A diet high in saturated fat increases risk of heart disease and some types of cancer. Excessive salt intake increases risk of high blood pressure. Potassium deficiency can cause listlessness and exhaustion. One should be cautious, however, about going to the other extreme by ingesting large quantities of vitamins and minerals. Overdoses of certain vitamins (especially vitamin A) and minerals (such as iron) are easy to achieve and can cause problems that are even more severe than deficiencies.

What can you do to nurture your health through nutrition? The categories in Table 14.6 are good places to start.

**Table 14.6**  Ten Steps to Personal Wellness

1. Exercise regularly.
2. Eat nutritious, balanced meals (high in vegetables, fruits, and grains, low in fat and cholesterol).
3. Maintain a sensible weight.
4. Sleep 7 to 8 hours nightly; rest/relax daily.
5. Wear seat belts and bike helmets.
6. Do not smoke or use drugs.
7. Use alcohol in moderation, if at all.
8. Engage only in protected, safe sex.
9. Get regular medical/dental check-ups; adhere to medical regimens.
10. Develop an optimistic perspective and supportive friendships.

We suggest, also, that you beware of nutritional fads, including dietary supplements that come with miraculous promises that seem almost too good to be true. Nutrition is a science in its infancy, and much remains to be discovered about its connections to physical and mental health.

## 14.9.3:  Sleep and Meditation

Sleep affects our health and stress in a variety of ways. First, given the well-known link between **REM sleep** and cognitive functioning, we are reminded that to deal effectively with the cognitive demands of potential stressors, we must get enough sleep to enjoy the long REM periods that come only after about 6 hours of sleep. In addition to the documented increased risk of accidents, chronic sleep deprivation has been linked to diabetes and heart disease, as well as decreased immune system functioning.

Meditation, which for many years was viewed with skepticism by Westerners, has earned increased consideration due to provocative new findings from a spate of studies. The ancient Buddhist practice of "mindful meditation" originated 2,500 years ago and, translated, means "to see with discernment" (Shapiro and others, 2005). Mindfulness-based stress reduction (MBSR), a modern variation on the Buddhist tradition, aims to increase awareness of one's reactions to stress, become at ease with them, and develop healthier responses. These goals are achieved in part through meditation that teaches the participant first to focus on body sensations and cognitions involved in stress reactions and then to let them go by fully accepting (rather than judging or resisting) them. Research on MBSR indicates that participation in an 8-week training program reduces stress; decreases risk of anxiety, depression, and burnout; and increases immune system functioning (Carlson and others, 2007; Shapiro and others, 2005). This fascinating work is just one example of how, in the 21st century, the pursuit of health is relying increasingly on East–West collaboration.

## 14.9.4:  The Power of Exercise: Enhancing Physical and Mental Health

The single most important thing that we can do to improve our health, both physical and mental, is to engage in **physical exercise** daily. We will see in this section the vast negative consequences of not doing so, of being physically inactive. However, even when people become aware of this vital information, their resolutions to change for the better often fail over time.

- *What can psychology do to help people of all ages find the will to go the right way toward enhanced health status by engaging in physical exercise?*

- *How can learning about this information help YOU to commit to engaging in a regular physical exercise program?*

**COSTS OF PHYSICAL INACTIVITY**  Epidemiologists have identified an "epidemic emergence of modern chronic diseases" that is affecting 90 million Americans (Booth and others, 2000, p. 774). Collectively these diseases are resulting in annual health care costs and lost productivity costs of almost two thirds of a *trillion dollars* (Booth and others, 2000). Curiously, this syndrome of diseases is not caused by what people are doing that is bad for them, but rather, what they are *not* doing that is good for them. This team of epidemiologists have documented a strong correlation between increased physical inactivity and the emergence of "modern chronic illnesses." More specifically, physical inactivity has been linked to increased incidence of at least 17 significant health issues, including risk factors for chronic diseases as well as chronic illnesses themselves. Alongside negative consequences for individuals, physical inactivity impacts the United States (and many other nations as well) on a much larger scale. Failure to engage in regular physical activity can contribute to weight gain that can in turn trigger obesity. Current estimates propose that about 60% of men and 50% of women are overweight, with 20% of men and 25% of women qualifying as obese (Cooper and others, 2000).

The United States spends $190.2 billion annually on obesity-related medical costs. That amounts to nearly 21% of the national U.S. health expenditure (Cawley & Meyerhoefer, 2011). This estimate is a vast increase from the earlier annual cost of obesity in 1995 ($51.6 billion in direct medical costs; Wolf & Colditz, 1998) and is expected to increase as current trends in rates of obesity continue. In addition to direct health care costs, obesity results in higher rates of disability and unemployment benefits, as well as job absenteeism. Clinical weight classification is positively correlated with number of workdays missed, resulting in an estimated $4.3 billion loss to businesses each year (Cawley and others, 2007).

**BENEFITS OF EXERCISE**  Engaging in regular physical activity is known to be one of the most important factors in improving and maintaining good health (Allen & Morey, 2010; National Prevention Council, n.d.). There is significant evidence illustrating the physical health benefits of engaging in regular physical activity. Documented short- and long-term benefits of regular exercise include:

- Strengthening bones and muscles
- Maintaining healthy blood pressure (National Prevention Council, n.d.)

- Preventing chronic diseases, such as coronary heart disease (Cooper and others, 2000), stroke, type 2 diabetes (Boule and others, 2001; Lee, 2003), various types of cancer (Lee, 2003), and even early death

An estimated 250,000 premature deaths occur each year in the United States due to physical inactivity (Booth and others, 2000).

Engaging in regular physical activity also aids in maintaining healthy body weight. Failure to do so can result in significant negative consequences. Individuals who are overweight run the risk of developing heart disease, high blood pressure, type 2 diabetes, gallstones, breathing problems, and certain cancers (U.S. Department of Health and Human Services, 2008.). A longitudinal study of 7867 adults provided data that associated being overweight or obese with increased and/or development of physical health difficulties over the brief course of only 4 years. Conversely, regular exercise significantly reduced the risk of health decline and the development of physical difficulties even among obese subjects, suggesting that exercise can even temper the negative effects of obesity on health (He & Baker, 2004). Regular exercise also reduces risk of complications associated with type 2 diabetes and can be more effective than certain commonly prescribed drugs Diabetes Prevention Program Research Group. (2002).

Exercise can be an effective stress management strategy as well as a way to prevent and treat clinical depression and anxiety (Carek and others, 2011; Centers for Disease Control and Prevention, 1996; Peluso & Guerra de Andrade, 2005). Research exists to suggest that regular physical activity may even result in lower likelihood of developing cognitive disorders such as dementia and Alzheimer's disease later in life (Larson and others, 2006). In general, it seems that exercise can help to increase quality of life in many different ways by promoting overall psychological well-being (Carek and others, 2011; Centers for Disease Control and Prevention, 1996), and also enhancing the quality of life in healthy individuals as well as those suffering from physical illnesses.

Clearly, the physical, emotional, and financial impact of physical inactivity is significant for individual Americans as well as for our nation as a whole. Regular physical activity is an integral part of primary prevention and long-term management efforts for a number of physical and mental health issues. Researchers (Booth and others, 2000) argue that promoting regular physical activity has the ability to:

1. Potentially prevent most chronic diseases before they start (i.e., primary prevention)
2. Profoundly and positively impact virtually all known chronic disease conditions, even after their diagnosis
3. Decrease morbidity while increasing longevity and vitality in older individuals

4. Improve mental health and sense of well-being
5. Have the ability to decrease annual U.S. health care spending by hundreds of billions of dollars while costing little to nothing to develop and sustain such exercise programs

**NATIONAL EXERCISE PROMOTION PROGRAMS**  A multitude of nationwide exercise promotion programs targeting various age groups are currently in existence. Perhaps the most well-known campaign currently aimed at increasing physical activity (as well as eating healthy foods) is the campaign of First Lady Michelle Obama's *Let's Move!* The website provides facts and statistics on the increasing rate of childhood obesity, consequences of physical inactivity, and benefits of regular exercise. Let's Move! also provides suggestions for activities and games that individuals and families can engage in together. It is also responsible for creating larger-scale changes in schools and communities (e.g., healthier meals offered in public schools), attempting to enact change on multiple levels.

The Let's Move! campaign was launched in 2010, with the goal of raising a generation of children more likely to make healthy life choices in the future (Let's Move, n.d.). Calling into question the effectiveness of this widely promoted campaign are recent data showing that 2 years later only one quarter of American children, ages 12 to 15 years, reported engaging in moderate- to high-intensity physical activity for the amount of time recommended by the initiative (i.e., 60 minutes daily; Fakhouri and others, 2014).

*Go4Life* is a physical activity promotion campaign that started in 2011 targeting adults. The Go4Life goal is to help adults incorporate physical activity into everyday life, facilitating a healthy aging process (National Institutes of Health, 2012). The website similarly offers resources to encourage and help individuals engage in regular physical activity. Unfortunately, from available data it is apparent that on a nationwide level there is limited efficacy of any current physical activity promotion campaign—it was totally unsuccessful at actually raising levels of physical activity (Health Development Agency, 2004).

**THE FAILURE OF HEALTH PROMOTION CAMPAIGNS**  Now for some distressing information. Exercising regularly has enormously positive effects both on our bodies and minds, but we don't follow through on good intentions to actually *do it!* Why not?

Although numerous health promotion campaigns like Let's Move! have attempted to address the issues of physical inactivity and obesity, there have been only minor changes in reported physical activity over the past 15 years, and studies demonstrate that rates of overweight, obesity (Cooper and others, 2000), and

other weight-related health consequences are on the rise. The number of overweight and obese adults is increasing at a faster rate than is found for children (0.8 vs. 0.46–0.49). If current trends continue, 86.3% of adults will be overweight or obese by 2030, resulting in weight-related health-care costs doubling every decade (Wang and others, 2012).

Approximately 50% of individuals who begin or renew an exercise regimen will drop out within 6 months to 1 year—regardless of the type of exercise being engaged in (Dishman, 1988; Robison & Rogers, 1994). Why aren't these exercise promotion programs more effective? What could inform the development of new, more effective campaigns? *How do we find the will?*

**CREATING MORE EFFECTIVE HEALTH PROMOTION**
It's imperative to learn ways to effectively encourage long-term adherence to an exercise program once a person has begun (Dishman, 1988). So a two-pronged approach is required: initiating and also sustaining regular physical activity regimens for children, young adults and older people.

**How do you think that ideal can be achieved?**

Past and current health promotion campaigns rely heavily on psychological threat or fear appeals to encourage positive behavior change (e.g., providing information about the negative consequences of inactivity to promote exercise). However, evidence suggests that this strategy is essentially ineffective for a large percentage of the population; some individuals simply seem to be less sensitive to these types of negative messages (Brengman and others, 2010). Psychologists should be working with media experts and health providers to craft new messages that are pretested to work effectively for different populations. For starters, they should rely on a positive self-concept and a future-oriented focus, and also engage the imagination of ideal personal possibilities.

People can learn to make exercise a regular part of their lives (Myers & Roth, 1997). Some of the keys are:

1. Finding an activity you like to do
2. Fitting exercise sessions into your schedule several times a week, posting them on your calendar
3. Having an exercise partner to provide the extra social support people need to stick with their program, so it becomes more of a social event
4. Making it a personal habit, like brushing teeth, or checking your cell for messages

And have you heard of "Tech Neck"? In the past, repetitive stress injuries came from typing on narrow keyboards that created carpal tunnel syndrome problems, requiring wrist surgery. Now, lurching forward to look down at the tiny screen on your cell phone is creating havoc with the neuromuscular bundle of arteries, veins, and muscles that travel from the neck to the hand.

Tech neck can cause headaches, neck pain and numbness in the hands. Most are those ages 18 to 39, with three

digital devices that are viewed up to 150 times a day. Remedies include chiropractic adjustments, medicinal creams, and laser surgery. But cheaper is behavior modification: hold the phone in front of your face, refrain from message surfing, and practice looking up, looking out, and actually talking with people.



Will *you* transform this information into a personal action goal of getting into better shape now. so you can live a longer and healthier life? We hope so. It has a double benefit: When you are in good shape, stressors have less impact and recovery from inevitable stressors is faster and more thorough.

# 14.10:  Putting It All Together: Developing Happiness and Subjective Well-Being

**Objective:**  Evaluate the concept of subjective well-being or SWB

Making changes to live a healthier life can lead to a feeling-good state that researchers call **subjective well-being (SWB)**, a psychologically more precise term for what you might call "happiness." Do you usually have that feeling?

We cannot observe happiness directly. Instead, in SWB studies, researchers rely on respondents' own ratings of their experiences, answers to questions about what they find satisfying, and assessments of their well-being, mood, or success (Diener, 1984, 2000). To avoid confusion about what words like *well-being* mean, researchers also use nonverbal scales like the one in the smiley-faces in Figure 14.12 (Andrews & Withey, 1976).

Happiness, or SWB, is an increasingly popular subject of study with psychologists, evident in the emerging field of positive psychology. Accumulating research (Myers, 2000; Myers & Diener, 1995) shows that, despite many individual differences, SWB is defined by three central components:

1. **Satisfaction with present life.** People who are high in SWB like their work and are satisfied with their current personal relationships. They are sociable and

**Figure 14.12**  The Faces Scale

"Which face comes closest to expressing how you feel about your life as a whole?" Researchers often use this simple scale to obtain people's ratings of their level of well-being. As the percentages indicate, most people select one of the happy faces.



| 20% | 46% | 27% | 4% | 2% | 1% | 0% |

outgoing, and they open up to others (Pavot and others, 1990). High-SWB people enjoy good health and high self-esteem (Baumeister and others, 2003; Janoff-Bulman, 1989, 1992).

2. **Relative presence of positive emotions.** High SWBs more frequently feel pleasant emotions, mainly because they evaluate the world around them in a generally positive way. They are typically optimistic and expect success (Seligman, 1991). They have an internal locus of control and are able to enjoy the "flow" of engaging work (Crohan and others, 1989; Csikszentmihalyi, 1990).

3. **Relative absence of negative emotions.** Individuals with a strong sense of subjective well-being experience fewer and less-severe episodes of negative emotions such as anxiety, depression, and anger. Very happy people are not emotionally extreme. They are positive (but not ecstatic) most of the time, and they do report occasional negative moods (Diener & Seligman, 2002).

What underlies a healthy response on these dimensions? Twin studies show that feelings of well-being are influenced by genetics (Lykken & Tellegen, 1996), but biology is not destiny: Environmental effects are revealed in studies showing that people feel unhappy if they lack social support, are pressured to pursue goals set by others, and infrequently receive positive feedback on their achievements. Accordingly, experts in this field suggest that feelings of well-being require the satisfaction of:

(a) A need to feel competent

(b) A need for social connection or relatedness

(c) A need for autonomy or a sense of self-control (Baumeister and others, 2003; Ryan & Deci, 2000)

**WHO ARE THE HAPPY PEOPLE?**  What characteristics and experiences are linked with feelings of subjective well-being and happiness? Before reading further, take a moment to consider whether you think some groups of people are happier than others. If so, which ones? A review of the SWB evidence by Myers and Diener (1995) shows that:

- **Younger (or older, or middle-aged) people are not happier than other age groups.** SWB cannot be predicted from someone's age. Although the causes of their happiness may change with age (Inglehart, 1990), an individual's SWB tends to remain relatively stable over a lifetime.

- **Happiness has no "gender gap."** While women are more likely than men to experience anxiety and depression, and men are more at risk for alcoholism and certain personality disorders, approximately equal numbers of men and women report being fairly satisfied with life (Fujita and others, 1991; Inglehart, 1990).

- **There are minimal racial differences in happiness.** African Americans and European Americans report nearly the same levels of happiness, with African Americans being slightly less vulnerable to depression (Diener and others, 1993). Despite racism and discrimination, members of disadvantaged minority groups generally seem to think optimistically—by making realistic self-comparisons and by attributing problems more to unfair circumstances than to themselves (Crocker & Major, 1989).

- **Money does not buy happiness.** It is true that people in wealthier societies report greater well-being. However, except for extremely poor nations like Bangladesh, once the necessities of food, shelter, and safety are provided, happiness is only weakly correlated with income. Poverty may be miserable, but wealth itself cannot guarantee happiness (Diener & Diener, 1996; Diener and others, 1993). The happiest people are not those who get what they want but rather those who want what they have (Myers & Diener, 1995).

- **Those who have a spiritual dimension in their lives most often report being happy (Myers & Diener, 1995).** This may result from many factors, including a

healthier lifestyle, social support, and optimistic thinking. Whatever the reasons, spiritually involved people seem to enjoy, on average, better mental and physical health (Seybold & Hill, 2001).

These findings tell us that life circumstances—one's age, sex, race, nationality, or income—do not predict happiness. The key factors in subjective well-being appear to be psychological traits and processes, many of which you have learned about in this chapter or elsewhere in this book. It is impressive to see how well people can adapt to major changes in their lives and still feel happy. For example, while the moods of victims of spinal cord injuries were extremely negative shortly after their accidents, several weeks later they reported feeling even happier than they had been before sustaining their injuries (Silver, 1983).

It is possible to work at creating sustained happiness in your life, according to psychologist Sonja Lyubomirsky (2007), in the summary of her many years of scientific study of this elusive concept, *How of Happiness*. To do so involves a kind of social-emotional fitness training that encourages focusing on positive emotions, creating vibrant social support networks around yourself, goal setting, making and keeping commitments, working to stay healthy with an active life style, and being sociocentric, making others feel special. There is now a Happiness "app" you can buy for your mobile phone that gives daily exercises and activities that are fun and healthful.

Overall, studies of happiness and well-being show that people are exceedingly resilient. Those who undergo severe stress usually manage to adapt. Typically, they return to a mood and level of well-being similar to—or even better than—that prior to the traumatic event (Headey & Wearing, 1992). Using effective coping strategies and making smart lifestyle choices both increase the likelihood of positive outcomes. These, then, are the final components in our search to understand individual differences in the impact of stress on our health.

---

## Psychology Matters

## Behavioral Medicine and Health Psychology

Amazingly, 93% of patients don't follow the treatment plans prescribed by their doctors (Taylor, 1990). Obviously, this can have terrible consequences. Accordingly, the need to understand why people fail to take their medicine, get little exercise, eat too much fat, and cope poorly with stress has stimulated the development of two new fields: behavioral medicine and health psychology.

1. **Behavioral medicine** is the medical field that links lifestyle and disease.

2. **Health psychology** is the comparable psychological specialty.

Practitioners in both fields are devoted to understanding the psychosocial factors influencing health and illness (Taylor, 1990, 2009). Among their many concerns are health promotion and maintenance; prevention and treatment of illness; causes and correlates of health, illness, and dysfunction; and improvement of the health care system and health policy (Matarazzo, 1980).

Both behavioral medicine and health psychology are actively involved in the prevention and treatment of trauma and disease that result from stressful or dangerous environments and from poor choices with regard to nutrition, exercise, and drug use. Both are emerging disciplines in countries all over the world (Holtzman, 1992). The two fields overlap, and the differences between them are ones of emphasis. Psychologists have brought increased awareness of emotions and cognitive factors into behavioral medicine, making it an interdisciplinary field rather than an exclusively medical specialty (Miller, 1983; Rodin & Salovey, 1989). Both fields also recognize the interaction of mind and body and place emphasis on preventing illness as well as on changing unhealthy lifestyles after illness strikes (Taylor, 1990, 2006).

But—as the saying goes—old habits die hard. To help patients change long-held habits that are harmful to their health, social psychologists have identified the specific persuasive strategies that are most effective (Zimbardo & Leippe, 1991). For example, research shows that people are more likely to comply with requests when they feel they have freedom of choice. Therefore, instead of demanding that a patient strictly adhere to one course of treatment, a physician could offer the patient several options and ask him or her to choose one. Studies also suggest that patients are most likely to adhere to physicians' requests when they get active social support from friends and family (Gottlieb, 1987; Patterson, 1985). And one major study of heart disease prevention (see Figure 14.13) found that specific skills training, such as workshops designed to help participants implement positive changes to their health habits, was the key that resulted in greatest change (Maccoby and others, 1977).

**Figure 14.13** Response to Campaign for Healthy Change



Overall, the field of psychology has contributed numerous findings and strategies—based on solid scientific evidence—that can be applied to our efforts to improve our health, both physically and mentally. You can apply many of these same principles on your own as you work toward maximizing your own personal health and wellness—and we wish you well on your journey!

# Critical Thinking Applied: Is Change Really Hazardous to Your Health?

The more we hear about the links between stress and illness, the more we might wonder if our own stress levels put us at risk. In this chapter, we have discussed a variety of factors that impact the stress–illness relationship. At least one issue, however, remains in question: To what extent do major life changes impact our vulnerability to illness?

Recall the **Social Readjustment Rating Scale (SRRS)** introduced in the first section of this chapter. If you calculated your own score, how should you interpret your score? If you scored high, does that mean you are at greater risk for illness?

## What Are the Critical Issues?

Recall, first, that the SRRS lists 43 life events that purport to be stressful. Given what we've learned about the importance of cognitive appraisal in determining how stressful a situation is to an individual, we should probably take a close look at the list of events to see if each one really would qualify as a stressor in our own lives.

## Does the Reasoning Avoid Common Fallacies?

The SRRS can allegedly predict your risk of illness based on the events of the past year of your life. In other words, it presents a cause–effect hypothesis that the number of life-change units (LCUs) you have experienced in the last year will cause a particular risk of illness. Are the research findings in support of the LCU–illness relationship really causal, or are they merely correlational?

## Extraordinary Claims Require Extraordinary Evidence

Second, if the claim that a quick and simple self-administered test can determine your risk for illness strikes you as extraordinary, you might be right. As we have learned, answers to psychological questions are rarely simple—humans are complex, and so are the explanations for our thoughts, feelings, and behaviors. At the very least, we might wonder if the SRRS oversimplifies the relationship between life events and illness.

## Does the Issue Require Multiple Perspectives?

Finally, we must acknowledge the many other factors involved in the link between stress and illness—such as those we have studied in this chapter—and ask what other perspectives might help explain the relationship between stress and illness.

## What Conclusions Can We Draw?

In the first 15 years after it was published, the SRRS was used in more than 1,000 studies worldwide (Holmes, 1979), and research consistently found correlations between scores on the SRRS and both physical and behavioral symptoms. People with higher scores on the scale were more at risk for heart attacks, bone fractures, diabetes, multiple sclerosis, tuberculosis, complications of pregnancy and birth, decline in academic performance, employee absenteeism, and many other difficulties (Holmes & Masuda, 1974). High SRRS scores among federal prisoners were even associated with the length of their prison sentences. And the test was effective across cultural boundaries, too: Both male and female respondents were found to rate events with similar scores (Holmes & Masuda, 1974), and ratings were also validated with Japanese, Latin American, European, and Malaysian samples.

However, the number of LCUs accumulated during the previous year is only a modest predictor of changes in a person's health (Johnson & Sarason, 1979; Rahe & Arthur, 1978). Many other factors—such as cognitive appraisal, stress moderators, and coping strategies—can intervene in the stress–illness relationship.

Moreover, the implication that stressful events cause illness is misleading (Dohrenwend & Shrout, 1985; Rabkin & Struening, 1976). The correlational data merely show a relationship between certain life changes and health; the research does not show that life changes are the cause of illness. The reverse could also be true: Illness can sometimes be the cause of life changes—someone who frequently gets colds or the flu is more likely to have problems at school, at work, and in relationships, for example. And remember the possibility of a third variable driving the relationship: Several other factors we've studied, such as economic status or Type-A hostility, could also be affecting both the frequency of life changes and the risk of illness.

The importance of multiple perspectives is critical to a thorough and accurate understanding of the stress–illness relationship. Let's review what we know about stress and health from the major perspectives we used to learn about psychology in this text:

- The **biological perspective** clearly plays a role in an individual's vulnerability to stress-related illness. We have seen that our hereditary makeup predisposes us to certain illnesses, such as heart disease, diabetes, obesity, and many forms of cancer. In addition, genetics probably gives some of us a better chance of being optimistic, hardy, or resilient—just as others of us are more at risk for hostility and other negative emotions.

- The **behavioral perspective** influences stress and illness in the health habits we learn as children growing up, in situations of learned helplessness, and in the coping strategies we see modeled by our parents and others in our immediate social environment. Likewise, the *sociocultural context*—the culture in which we live—creates social norms that influence these learned

habits and strategies. Currently, for example, in Western culture, we receive mixed messages about health. On one hand, we hear a lot about the importance of a healthy diet and regular exercise. On the other hand, however, the fast-paced nature of our culture—combined with a barrage of ads for fast food—encourages us to grab a burger and fries, then sit on the couch and watch television instead of working out and preparing a healthy meal.

- The **cognitive perspective** helps us understand why, in a particular culture, individual health habits and perspectives vary. Someone with an internal locus of control, for example, would be more likely than an external to pay attention to diet and exercise in pursuit of a healthy life. Likewise, an optimistic thinker or someone high in hardiness would be more likely to perceive certain life events as possibilities than as threats. In general, people's chances of incurring an illness may be more related to their interpretations and responses to life changes than to the changes themselves (Lazarus and others, 1985).

- The **developmental perspective** illuminates certain aspects of stress and health as well. College students, for example—who are primarily in early adulthood—are at change points in their lives and tend to get high scores; it is not clear, however, if they are more at risk for illness. Youth may offer some protection. Similarly, as our bodies age and our cells become less effective at regeneration, we develop greater susceptibility to illness in late adulthood. It is possible, though, that older adults who have mastered the challenges of generativity and integrity may offset their physical

vulnerability with a better system of stress moderators and coping strategies. Much research remains to be done at the intersection of developmental and health psychology.

- The **whole-person perspective** explains many of the personal qualities that have an impact on an individual's vulnerability to stress. Locus of control, optimism, hardiness, resilience, and Type A behavior all originated in the study of personality psychology, and we have seen how these factors moderate an individual's response to stressors. Likewise, traits such as openness to experience and conscientiousness probably affect the degree to which individuals are willing to try new coping strategies or lifestyle habits, as well as their likelihood of sticking to the changes once they've made them.

Clearly, then, there is much more to the relationship between stress and illness than the particular life events you experience. A high score does not mean that illness is certain, nor does a low score guarantee health. People differ in their abilities to deal with change because of genetic differences, general physical condition, personality and outlook, lifestyles, and coping skills. The SRRS takes none of these factors into account, but it remains the most widely used measure of stress-related risk for illness.

Should you, then, pay attention to your SRRS score? We offer it as one source of information about your own possible vulnerability—and we trust that you will interpret your score with caution. Overall, we hope you will keep in mind the many tools you have accumulated that, together, can help you respond more effectively to potential stressors—and ultimately live a longer and healthier life.

# Summary: From Stress to Health and Well-Being

## Chapter Problem

Were the reactions and experiences of the 9/11 firefighters and others at the World Trade Center attacks typical of people in other stressful situations? And what factors explain individual differences in our physical and psychological responses to stress?

- Surviving firefighters had a variety of responses to their involvement in the WTC disaster, including physical, behavioral, cognitive, and emotional stress responses. Aside from physical injuries and memories peculiar to this particular event, their responses were typical of others who have experienced stressful situations.

- Despite a cluster of similar symptoms that occur regardless of the stressor, research is revealing some response differences that depend on whether the stressor involves personal loss, humiliation or rejection, experience of a catastrophe, and possibly other factors.

- Regardless of the cause, however, stress must be understood from multiple psychological perspectives, including the biological, behavioral, developmental, social-cultural, cognitive, and whole-person perspectives.

- There are also individual differences in our responses to stress. These depend on the intensity and duration of the stressor, culture background, coping strategies,

social support, and stress *moderators*, as well as other stressors present in our lives. Shelly Taylor has also suggested that women and men have different response styles in the face of stress.

## What Causes Distress?

### Core Concept 14.1

**Traumatic events, chronic lifestyle conditions, major life changes, and even minor hassles can all cause a stress response.**

**Stressors** are external events that cause internal stress responses, both psychological and emotional ones, termed **distress**, and biological and physiological reactions. And while **cognitive appraisal** influences our individual responses to stressors, there are several major categories of events that typically cause stress.

**Traumatic stressors** include natural disasters, acts of **terrorism**, or sudden personal loss such as the death of a loved one or an unforeseen breakup. All of these situations occur with little or no warning and almost always cause extreme stress in the immediate aftermath of the event. Research indicates that about 20% of survivors of natural disaster remain distressed after 1 year, while as many as 75% of those exposed to a terrorist attack report continued worry at the 1-year mark. Repeated media coverage of the event often exacerbates and prolongs the effects and can also cause stress in people who were not directly exposed to the event in a phenomenon known as **vicarious traumatization**. **Grief** is a normal, healthy process in response to a personal loss, and the humiliation associated with **social rejection** can put an individual at increased risk for depression.

**Posttraumatic stress disorder (PTSD)** can occur in individuals who have been exposed to severe circumstances such as combat, rape, or other violent attack. Symptoms of PTSD can be cognitive, behavioral, and emotional, as evidenced (for example) by difficulty concentrating, an exaggerated "startle response," and survivor's guilt. About 8% of Americans will experience PTSD at some time in their lives, with symptoms lasting more than 10 years in more than one-third of cases. Combat personnel may be especially at risk for PTSD, and clinical psychologists are working increasingly to develop and provide more effective education and treatment for combat veterans and their families.

**Chronic stressors** have a more gradual onset and are longer lasting than traumatic events. **Societal stressors** such as poverty and unemployment, as well as difficulties at home, school, or work, are one type of chronic stressor. Another is **burnout**, which is a syndrome of emotional exhaustion, physical fatigue, and cognitive weariness that results from demanding and unceasing pressures at work, at home, or in relationships. **Compassion fatigue** is found in medical and psychological professionals as well as caregivers and other individuals who spend a great deal of time caring for others. Research in this area offers at least five steps caregivers and service providers can take to reduce their risk of compassion fatigue.

Major life changes—whether positive or negative—can be a source of stress as well, in that they involve changes in our daily routines and adaptation to new situations and environments. Finally, minor **hassles** such as computer crashes or an incessantly barking dog can accumulate and cause stress that adds up over time.

## How Does Stress Affect Us Physically?

### Core Concept 14.2

**The physical stress response begins with arousal, which stimulates a series of physiological responses that in the short term are adaptive but that can turn harmful if prolonged.**

When faced with **acute stressors**, our bodies are equipped with amazing abilities to meet the challenges effectively. The **fight-or-flight response** is produced by the autonomic nervous system and includes such immediate changes as accelerated heart rate, increased respiration and blood pressure, perspiration, and pupil dilation. A more comprehensive explanation of our response to stress is offered by Hans Selye's **general adaptation syndrome (GAS)**. A three-phase system, the GAS begins with the **alarm phase**, then progresses into the **resistance phase** and finally the **exhaustion phase** if the stressor is chronic in nature. Under such circumstances, the resources that so effectively helped us combat an acute stressor become depleted, resulting in a host of physical and emotional symptoms. Consequently, we become more vulnerable to illness. While the fight-or-flight response has been well documented in both animals and humans, psychologist Shelley Taylor notes an alternative pattern of response to stress. Her **tend-and-befriend** theory suggests that social support seeking can be a more effective response to stress when protection or survival of offspring is involved. These models complement each other rather than competing with each other in helping us understand the complex human stress response.

The field of **psycho-neuroimmunology** tries to understand how stress causes illness by studying brain–body relationships. Research in this area has revealed that the central nervous system and the immune system remain in constant communication with each other in response to stress. **Cytokines** are proteins that fight infection but, under prolonged stress, produce feelings of listlessness and depression. One way in which stress affects physical health is by accelerating the rate at which cells age, which can be measured by examining the length of **telomeres**.

Shorter telomeres are associated with several diseases as well as with early death. Sadly, they become shorter among those who are caregivers for dying children or other family members. On the positive side, upbeat cognitive appraisals affect cell aging for the better, and thus play an important role in the stress–illness relationship.

## Who Is Most Vulnerable to Stress?

### Core Concept 14.3

**Personality characteristics affect our individual responses to stressful situations and, consequently, the degree to which we are distressed when exposed to potential stressors.**

Stress moderators reduce the impact of stressors on our perceived level of stress. Most of them function as variations of cognitive appraisal (although often on a nonconscious level). Hostile individuals are more likely to perceive stress in the face of a stressful situation and consequently have twice the risk of heart disease. Fortunately, stress-management programs have proven effective at reducing these individuals' response to stress and their resulting health vulnerability.

**Locus of control** is a second personality characteristic that has an impact on the stressor–stress relationship. People with an **internal** locus of control have greater resistance to stress than do **externals**, probably as a result of their perceived capability to take some action to ameliorate it. Locus of control has been found to affect not only stress but also health and longevity. While locus of control may have some genetic underpinnings, our experiences also influence it, as evidenced by research on **learned helplessness**. From a cultural perspective, **secondary control** involves controlling one's reactions to events rather than controlling the events themselves and is more prevalent in Eastern cultures. Research has found both types of control to be effective in the cultures in which they operate.

**Hardiness** is an outlook based on three Cs—a perception of internal control, of change as a challenge rather than a threat, and of commitment to life activities rather than alienation or withdrawal. Individuals with a hardy attitude exhibit greater resistance to stress. Similarly, optimistic people feel less stressed in the face of stressful situations, as they are more likely to focus on the positives rather than the negatives of the situation. **Optimism** is also characterized by specific, situational, and temporary attributions about negative situations. Both hardiness and optimism, like locus of control, appear to have some biological underpinnings but can be improved with well-designed training programs. **Resilience** is the ability to rebound and adapt to challenging circumstances and is related to optimism and hardiness, as well as social skills, cognitive abilities, and resources such as caring parents or support providers.

## How Can We Transform Negative Stress into Positive Life Strategies?

### Core Concept 14.4

**Effective coping strategies reduce the negative impact of stress on our health, while positive lifestyle choices can enhance our mental and physical health as well as our overall well-being.**

**Coping** involves taking action that reduces or eliminates the causes of stress rather than just the symptoms of stress. **Problem-focused coping** is accomplished by specific actions aimed at resolving a problem or stressor, whereas **emotion-focused coping** relies on efforts to regulate our emotional response to stress. Both types of coping can be useful and sometimes work best together. **Cognitive restructuring** is another type of effective **coping strategy** and involves modifying our perceptions of the stressor or our reactions to it. Cognitive restructuring can include **upward** and **downward social comparisons**.

Cultivating positive emotions, including humor, also helps reduce the effects of stress on our health, as can efforts to find meaning in the stressful situation. In finding meaning, making sense of the event appears to be the first step, but those who ultimately succeed in finding meaning in tragedy must also identify some benefit of the event or situation. **Psychological debriefing**, which in some cases takes the form of **critical incident stress debriefing (CISD)**, has been found to be relatively ineffective in reducing the link between stress and illness.

A variety of **positive lifestyle choices** carry a two-for-one benefit to the stress–illness puzzle: They can increase our resistance to stress and also decrease our vulnerability to stress-related illness. **Social support** may be the most important of these lifestyle factors, as people with stronger social support live longer and healthier lives than those with little or no support. Social support is helpful in that it carries emotional, tangible, and informational benefits. Regular aerobic exercise has both physical and psychological benefits and has been found to reduce the impact of stress on our health. Similarly, a healthy diet, adequate sleep, and even meditation have been found to decrease our vulnerability to stress and illness.

**Physical exercise** has been shown to have many positive effects on creating both a healthy body and also a healthy mind, as well as preventing and moderating a wide range of diseases. Despite the availability of national exercise programs, most of them fail over time because too many people with initial good intentions fail to follow through with a daily exercise regime.

**Subjective well-being (SWB)** includes satisfaction with life, prevalence of positive emotions, and absence of negative emotions. Like many of the concepts we have studied, an individual's SWB is influenced both by heredity and by environment. Neither age nor wealth predicts

happiness—happy people can be found in the youngest and the oldest, the richest and the poorest, and even in victims of serious illness or life-changing injury.

## Critical Thinking Applied: Is *Change* Really Hazardous to Your Health?

The relationship between life change events and illness, as indexed by the SRRS, is much more complex than originally thought. While extreme high and low scores offer some useful predictions of probabilities of future stress-related effects, they do not include all the many other factors outlined in this chapter. Illness can be caused by prolonged exposure to situational stressors, but that link is moderated by a host of cognitive, affective, social and cultural factors. How we interpret the stressor, how we have learned to cope, the social support we can rely on, and other processes can alter that link of external stressor and personal health response.

# Glossary

**Absent-mindedness**    Forgetting caused by lapses in attention.

**Absolute threshold**    The amount of stimulation necessary for a stimulus to be detected. In practice, this means that the presence or absence of a stimulus is detected correctly half the time over many trials.

**Abu Ghraib Prison**    Prison in Iraq made famous by revelation of photos taken by Army Reserve MP guards in the acts of humiliating and torturing prisoners.

**Accommodation**    A mental process that modifies schemas in order to include (or accommodate) new information.

**Acoustic encoding**    The conversion of information, especially semantic information, to sound patterns in working memory.

**Acquisition**    The initial learning stage in classical conditioning, during which the conditioned response comes to be elicited by the conditioned stimulus.

**Action potential**    The nerve impulse caused by a change in the electrical charge across the cell membrane of the axon. When the neuron "fires," this charge travels down the axon and causes neurotransmitters to be released by the terminal buttons.

**Activation-synthesis theory**    The theory that dreams begin (are activated) with random electrical activation coming from the brain stem. Dreams, then, are the brain's attempt to make sense of (to synthesize) this random activity.

**Active listener**    A person who gives the speaker feedback in such forms as nodding, paraphrasing, maintaining an expression that shows interest, and asking questions for clarification.

**Acute stress**    A temporary state of arousal, caused by a stressor, with a distinct onset and limited duration.

**Adaptive**    Aiding in survival or adaptation to one's environment.

**Addiction**    A condition in which a person continues to use a drug despite its adverse effects—often despite repeated attempts to discontinue using the drug. Addiction may be based on physical or psychological dependence.

**Adolescence**    In industrial societies, a developmental period beginning at puberty and ending (less clearly) at adulthood.

**Adoption study**    A method of separating the effect of nature and nurture by which investigators compare characteristics of adopted children with those of individuals in their biological and adoptive families.

**Affective disturbances**    Disorders of emotion or mood.

**Afterimages**    Sensations that linger after the stimulus is removed. Most visual afterimages are negative afterimages, which appear in reversed colors.

**Agonists**    Drugs or other chemicals that enhance or mimic the effects of neuro-transmitters.

**Agoraphobia**    A fear of public places and open spaces, commonly accompanying panic disorder.

**Alarm phase**    First phase of the GAS, during which body resources are mobilized to cope with the stressor.

**Algorithms**    Problem-solving procedures or formulas that guarantee a correct outcome, if correctly applied.

**All-or-none principle**    Refers to the fact that the action potential in the axon occurs either completely or not at all.

**Alzheimer's disease**    A degenerative brain disease usually noticed first by its debilitating effects on memory.

**Ambiguous figures**    Images that can be interpreted in more than one way. There is no "right" way to see an ambiguous figure.

**Amplitude**    The physical strength of a wave. This is shown on graphs as the height of the wave.

**Amygdala**    A limbic system structure involved in memory and emotion, particularly fear and aggression. Pronounced a-MIG-da-la.

**Analysis of transference**    The Freudian technique of analyzing and interpreting the patient's relationship with the therapist, based on the assumption that this relationship mirrors unresolved conflicts in the patient's past.

**Analytical intelligence**    According to Sternberg, the ability measured by most IQ tests; includes the ability to analyze problems and find correct answers.

**Anchoring bias**    A faulty heuristic caused by basing (anchoring) an estimate on a completely irrelevant quantity.

**Anecdotal evidence**    First-hand accounts that vividly describe the experiences of one or a few people, but may erroneously be assumed to be scientific evidence.

**Animistic thinking**    A preoperational mode of thought in which inanimate objects are imagined to have life and mental processes.

**Anorexia nervosa**    An eating disorder involving persistent loss of appetite that endangers an individual's health and stemming from emotional or psychological reasons rather than from organic causes.

**Antagonists**    Drugs or other chemicals that inhibit the effects of neurotransmitters.

**Anterograde amnesia**    The inability to form new memories (as opposed to retrograde amnesia, which involves the inability to remember information previously stored in memory).

**Antianxiety drugs**    A category of medicines that includes the barbiturates and benzodiazepines, drugs that diminish feelings of anxiety.

**Antidepressants**    Medicines that treat depression, usually by their effects on the serotonin and/or norepinephrine pathways in the brain.

**Antipsychotics**    Medicines that diminish psychotic symptoms, usually by effects on the dopamine pathways in the brain.

**Antisocial personality disorder**    Condition involving a lack of conscience or a sense of responsibility to others.

**Anxiety disorder**   Mental problem characterized mainly by anxiety. Anxiety disorders include panic disorder, generalized anxiety disorder, agoraphobia, and specific phobias.

**Anxious-ambivalent attachment**   One of two primary response patterns seen in insecurely attached children in which a child wants contact with the caregiver, shows excessive distress when separated from the caregiver, and proves difficult to console even when reunited.

**Applied psychologists**   Psychologists who use the knowledge developed by experimental psychologists to solve human problems.

**Aptitudes**   Innate potentialities (as contrasted with abilities acquired by learning).

**Archetype**   One of the ancient memory images in the collective unconscious. Archetypes appear and reappear in art, literature, and folktales around the world.

**Artificial concepts**   Concepts defined by rules, such as word definitions and mathematical formulas.

**Asch effect**   A form of conformity in which a group majority influences individual judgments of unambiguous stimuli, as with line judgments.

**Assimilation**   A mental process that incorporates new information into existing schemas.

**Association cortex**   Cortical regions throughout the brain that combine information from various other parts of the brain.

**Attachment**   The enduring socio-emotional relationship between a child and a parent or other regular caregiver.

**Attention**   A process by which consciousness focuses on a single item or "chunk" in working memory.

**Attention-deficit hyperactivity disorder (ADHD)**   A developmental disorder involving short attention span, distractibility and difficulty concentrating, poor impulse control, and excessive activity.

**Authoritarian parent**   One of the four parenting styles, characterized by demands for conformity and obedience, with little tolerance for discussion of rules, which the parent enforces with punishment or threats of punishment.

**Authoritative parent**   One of the four parenting styles, characterized by high expectations of the children, which the parent enforces with consequences, rather than punitive actions. Authoritative parents combine high standards with warmth and respect for the child's views.

**Autism spectrum disorder**   A new diagnostic term in the *DSM-5,* suggesting that various forms of autism that were previously called *autistic disorder, Asperger's disorder,* and *pervasive developmental disorder* should be seen as lying on a single spectrum, involving impairment in social communication and restricted interests, rather than as distinct disorders.

**Autokinetic effect**   The perceived motion of a stationary dot of light in a totally dark room; used by Muzafir Sherif to study the formation of group norms.

**Autonomic nervous system**   The portion of the peripheral nervous system that sends communications between the central nervous system and the internal organs and glands.

**Autonomy**   In Erikson's theory, autonomy is the major developmental task of the second stage in childhood. Achieving autonomy involves developing a sense of independence, as opposed to being plagued by self-doubt.

**Availability bias**   A faulty heuristic strategy that estimates probabilities based on the availability of vivid mental images of the event.

**Aversion therapy**   As a classical conditioning procedure, aversive counterconditioning involves presenting the individual with an attractive stimulus paired with unpleasant (aversive) stimulation to condition a repulsive reaction.

**Avoidant attachment**   One of two primary response patterns seen in insecurely attached children, in which a child shows no interest in contact with the caregiver and displays neither distress when separated from the caregiver nor happiness when reunited.

**Axon**   In a nerve cell, an extended fiber that conducts information from the soma to the terminal buttons. Information travels along the axon in the form of an electric charge called the action potential.

**Babbling**   The production of repetitive syllables, characteristic of the early stages of language acquisition.

**Barbiturates**   Drugs that act as depressants to the central nervous system.

**Base rate information**   The probability of a characteristic occurring in the general population period.

**Basic anxiety**   An emotion, proposed by Karen Horney, that gives a sense of uncertainty and loneliness in a hostile world and can lead to maladjustment.

**Basilar membrane**   A thin strip of tissue sensitive to vibrations in the cochlea. The basilar membrane contains hair cells connected to neurons. When a sound wave causes the hair cells to vibrate, the associated neurons become excited. As a result, the sound waves are converted (transduced) into nerve activity.

**Behavior modification**   Another term for behavior therapy.

**Behavior therapy**   Any form of psychotherapy based on the principles of behavioral learning, especially operant conditioning and classical conditioning.

**Behavioral learning**   Forms of learning, such as classical conditioning and operant conditioning, that can be described in terms of stimuli and responses.

**Behavioral medicine**   Medical field specializing in the link between lifestyle and disease.

**Behavioral perspective**   A psychological viewpoint that finds the source of our actions in environmental stimuli rather than in inner mental processes.

**Behaviorism**   A historical school (as well as a modern perspective) that has sought to make psychology an objective science focusing only on behavior—to the exclusion of mental processes.

**Benefit finding**   The second phase of finding meaning in a stressful situation, which involves seeing some ultimate benefit from the stressor.

**Benzodiazepines**   A type of depressant commonly used to treat anxiety disorders.

**Big Five/Big Five Traits**   *See* Five-factor theory.

**Binding problem**    Refers to the process used by the brain to combine (or "bind") the results of many sensory operations into a single percept. This occurs, for example, when sensations of color, shape, boundary, and texture are combined to produce the percept of a person's face. No one knows exactly how the brain does this. Thus, the binding problem is one of the major unsolved mysteries in psychology.

**Binocular cues**    Information taken in by both eyes that aids in depth perception, including binocular convergence and retinal disparity.

**Biological drive**    A motive, such as thirst, that is based primarily in biology. A *drive* is a state of tension that motivates an organism to satisfy a biological need.

**Biological needs**    Conditions that the body needs for survival and well-being. Biological needs involve such things as food, water, warmth, oxygen, and sleep. Biological needs are sometimes called physiological needs.

**Biological perspective**    The psychological perspective that searches for the causes of behavior in the functioning of genes, the brain and nervous system, and the endocrine (hormone) system.

**Biomedical therapy**    Treatment that focuses on altering the brain, especially with drugs, psychosurgery, or electroconvulsive therapy.

**Biopsychology**    The specialty in psychology that studies the interaction of biology, behavior, and mental processes.

**Bipolar cells**    These cells collect information from the rods and cones about the nature of light stimulating the retina. They pass the information on to retinal ganglion cells, which form the optic nerve.

**Bipolar disorder**    A mental abnormality involving swings of mood from mania to depression.

**Bisexuality**    Refers to romantic or erotic attraction to both the same and opposite sexes.

**Blind spot**    The point where the optic nerve exits the eye and where there are no photoreceptors. Any stimulus that falls on this area cannot be seen.

**Blindsight**    The ability to locate objects despite damage to the visual system making it impossible for a person consciously to see and identify objects. Blindsight is thought to involve unconscious visual processing in the where pathway.

**Blocking**    Forgetting that occurs when an item in memory cannot be accessed or retrieved. Blocking is caused by interference.

**Bobo Doll Experiment**    Albert Bandura showed that children were more aggressive after punching an inflatable Bobo doll.

**Bodily-kinesthetic intelligence**    Advanced abilities in fine motor skills, physical movement, and body awareness.

**Body image**    An individual's perception of and feelings about their physical ap-pearance.

**Borderline personality disorder**    Condition of instability and impulsivity; persons have unpredictable moods and stormy interpersonal relationships, with little tolerance for frustration.

**Bottom-up processing**    Perceptual analysis that emphasizes characteristics of the stimulus, rather than our concepts and expectations. "Bottom" refers to the stimulus, which occurs at step one of perceptual processing.

**Brain stem**    The most primitive of the brain's three major layers. It includes the medulla, pons, and the reticular formation.

**Brightness**    A psychological sensation caused by the intensity (amplitude) of light waves.

**Bulimia nervosa**    An eating disorder characterized by eating binges followed by "purges," induced by vomiting or laxatives; typically initiated as a weight-control measure.

**Bullying**    The act of tormenting others, in school classrooms or work settings, by one or more people, for personal, sadistic pleasure. It qualifies as a form of ordinary or everyday evil.

**Burnout**    A syndrome of emotional exhaustion, physical fatigue, and cognitive weariness, often related to work.

**Bystander intervention problem**    Laboratory and field study analogues of the difficulties faced by bystanders in real emergency situations.

**Cannon–Bard theory**    The counterproposal that an emotional feeling and an internal physiological response occur at the same time: One is not the cause of the other. Both were believed to be the result of cognitive appraisal of the situation.

**Case study**    Research involving a single individual (or, at most, a few individuals).

**Catastrophic event**    A sudden, violent calamity, either natural or manmade, that causes trauma.

**Catharsis**    A theory suggesting that emotional pressure can be relieved by expressing feelings directly or indirectly.

**CBD, or cannabidiol**    A cannabis compound, increasingly used for medicinal purposes, that incurs fewer psychoactive effects. .

**Central nervous system (CNS)**    The brain and the spinal cord.

**Centration**    A preoperational thought pattern involving the inability to take into account more than one factor at a time.

**Cerebellum**    The "little brain" attached to the brain stem. The cerebellum is responsible for coordinated movements.

**Cerebral cortex**    The thin gray matter covering the cerebral hemispheres, consisting of a ¼-inch layer dense with cell bodies of neurons. The cerebral cortex carries on the major portion of our "higher" mental processing, including thinking and perceiving.

**Cerebral dominance**    The tendency of each brain hemisphere to exert control over different functions, such as language or perception of spatial relationships.

**Cerebral hemispheres**    The large symmetrical halves of the brain located atop the brain stem.

**Cerebrum**    The total of the two brain hemispheres.

**Chameleon effect**    The tendency to mimic other people, named after the animal that changes its skin color to fit into its varied environments.

**Change blindness**    A perceptual failure to notice that a visual scene has changed from the way it had appeared previously. Unlike inattentional blindness, change blindness

requires comparing a current scene to one from the past, stored in memory.

**Childhood amnesia**    The inability to remember events during the first two or three years of life.

**Chromosome**    Tightly coiled threadlike structure along which the genes are organized, like beads on a necklace. Chromosomes consist primarily of DNA.

**Chronic stressor**    Long-lasting stressful condition.

**Chronological age (CA)**    The number of years since the individual's birth.

**Chunking**    Organizing pieces of information into a smaller number of meaningful units (or chunks)—a process that frees up space in working memory.

**Circadian rhythm**    A physiological pattern that repeats approximately every 24 hours—such as the sleep–wakefulness cycle.

**Classical conditioning**    A form of behavioral learning in which a previously neutral stimulus acquires the power to elicit the same innate reflex produced by another stimulus.

**Client-centered therapy**    A humanistic approach to treatment developed by Carl Rogers, emphasizing an individual's tendency for healthy psychological growth through self-actualization.

**Closure**    The Gestalt principle that identifies the tendency to fill in gaps in figures and to see incomplete figures as complete.

**Cochlea**    The primary organ of hearing; a coiled tube in the inner ear, where sound waves are transduced into nerve messages.

**Cognition**    Refers to thinking processes, including reasoning, imagining, judging, deciding, remembering, problem solving, and interpreting.

**Cognitive appraisal**    Our interpretation of a stressor and our resources for dealing with it.

**Cognitive development**    The global term for the development of thought processes from childhood through adulthood.

**Cognitive disinhibition**    A propensity to allow seemingly irrelevant information access to attention and consciousness.

**Cognitive dissonance**    A highly motivating state in which people have conflicting cognitions, especially when their voluntary actions conflict with their attitudes or values. Leon Festinger was its originator.

**Cognitive map**    In Tolman's work, a cognitive map was a mental representation of a maze or other physical space. Psychologists often used the term cognitive map more broadly to include an understanding of connections among concepts. Thus, a cognitive map can represent either a physical or a mental "space."

**Cognitive neuroscience**    An interdisciplinary field involving cognitive psychology, neurology, biology, computer science, linguistics, and specialists from other fields who are interested in the connection between mental processes and the brain.

**Cognitive perspective**    Another of the main psychological viewpoints distinguished by an emphasis on mental processes, such as learning, memory, perception, and thinking, as forms of information processing.

**Cognitive restructuring**    Reappraising a stress–or with the goal of seeing it from a more positive perspective.

**Cognitive therapy**    Emphasizes rational thinking (as opposed to subjective emotion, motivation, or repressed conflicts) as the key to treating mental disorders.

**Cognitive–behavioral therapy**    A newer form of psychotherapy that combines the techniques of cognitive therapy with those of behavioral therapy.

**Cohesiveness**    Solidarity, loyalty, and a sense of group membership.

**Collective unconscious**    Jung's addition to the unconscious, involving a reservoir for instinctive "memories," including the archetypes, which exist in all people.

**Collectivism**    The view, common in Asia, Africa, Latin America, and the Middle East, that values group loyalty and pride over individual distinction.

**Color**    Also called hue. Color is not a property of things in the external world. Rather, it is a psychological sensation created in the brain from information obtained by the eyes from the wavelengths of visible light.

**Color blindness**    Typically a genetic disorder (although sometimes the result of trauma, as in the case of Jonathan) that prevents an individual from discriminating certain colors. The most common form is red–green color blindness.

**Coma**    An unconscious state, during which a person lacks the normal cycles of sleep and wakefulness, that usually lasts only a few days. The comatose state differs from the minimally conscious state and the persistent vegetative state.

**Combination therapy**    A therapeutic approach that involves both psychological and medical techniques—most often a drug therapy with a behavioral or cognitive–behavioral therapy.

**Community mental health movement**    An effort to deinstitutionalize mental patients and to provide therapy from outpatient clinics. Proponents of community mental health envisioned that recovering patients could live with their families, in foster homes, or in group homes.

**Compassion fatigue**    A state of exhaustion experienced by medical and psychological professionals, as well as caregivers, which leaves the individual feeling stressed, numb, or indifferent.

**Compassion satisfaction**    A sense of appreciation felt by a caregiver, medical or psychological professional, of the work he or she does.

**Computer metaphor**    The idea that the brain is an information-processing organ that operates, in some ways, like a computer.

**Concept hierarchies**    Levels of concepts, from most general to most specific, in which a more general level includes more specific concepts—as the concept of "animal" includes "dog," "giraffe," and "butterfly."

**Concepts**    Mental groupings of similar objects, ideas, or experiences.

**Concrete operational stage**    The third of Piaget's stages, when a child understands conservation but still is incapable of abstract thought.

**Conditioned reinforcer or secondary reinforcer**  A stimulus, such as money or tokens, that acquires its reinforcing power by a learned association with primary reinforcers.

**Conditioned response (CR)**  In classical conditioning, a response elicited by a previously neutral stimulus that has become associated with the unconditioned stimulus.

**Conditioned taste aversion**  A classically conditioned avoidance of certain foods or tastes.

**Conditioned stimulus (CS)**  In classical conditioning, a previously neutral stimulus that comes to elicit the conditioned response. Customarily, in a conditioning experiment, the neutral stimulus is called a conditioned stimulus when it is first paired with an unconditioned stimulus (UCS).

**Conditions of worth**  Giving personal approval, love, or positive regard only under certain conditions.

**Cones**  Photoreceptors in the retina that are especially sensitive to colors but not to dim light. You may have guessed that the cones are cone-shaped.

**Confirmation bias**  The tendency to attend to evidence that complements and confirms our beliefs or expectations, while ignoring evidence that does not.

**Conformity**  The tendency for people to adopt the behaviors, attitudes, and opinions of other members of a group.

**Conscientiousness**  Personal quality of keeping one's promises, acting out one's values in the best manner.

**Consciousness**  The process by which the brain creates a mental model of our experience. The most common, or ordinary, consciousness occurs during wakefulness, although there are can be altered states of consciousness.

**Conservation**  The understanding that the physical properties of an object or substance do not change when appearances change but nothing is added or taken away.

**Consolidation**  The process by which short-term memories become long-term memories over a period of time.

**Contact comfort**  Stimulation and reassurance derived from the physical touch of a caregiver.

**Contingency management**  An operant conditioning approach to changing behavior by altering the consequences, especially rewards and punishments, of behavior.

**Continuous reinforcement**  A type of reinforcement schedule by which all correct responses are reinforced.

**Contralateral pathways**  Sensory and motor pathways between the brain and the rest of the body cross over to the opposite side en route, so messages from the right side of the body are processed by the left side of the brain and vice versa.

**Contralateral processing**  Stimuli from one side of the body are processed by the opposite side of the brain.

**Control group**  Participants who are used as a comparison for the experimental group. The control group is not given the special treatment of interest.

**Conventional morality**  Kohlberg's second stage of moral reasoning.

**Conversion disorder**  A type of somatoform disorder marked by paralysis, weakness, or loss of sensation but with no discernible physical cause. Alternatively, the *DSM-5* offers the clunky-but-more–precise term *functional neurological symptom disorder,* which avoids the Freudian connotations implied by the term *conversion disorder.*

**Coping**  Taking action that reduces or eliminates the causes of stress, not merely its symptoms.

**Coping strategy**  An action that reduces or eliminates the impact of stress.

**Corpus callosum**  The band of nerve cells connecting and enabling communication between the two cerebral hemispheres.

**Correlation-causation bias or fallacy**  Assuming that, because two factors are related, one is causing the other.

**Correlational study**  A form of research in which the relationship between variables is studied, but without the experimental manipulation of an independent variable. Correlational studies cannot determine cause-and-effect relationships.

**Cortisol**  A steroid produced by the fight-or-flight response.

**Counterconditioning**  Using classical conditioning to replace an unwanted association with a preferred association by pairing the fear object (the CS) with a positive stimulus.

**Creative intelligence**  According to Sternberg, the form of intelligence that helps people see new relationships among concepts; involves insight and creativity.

**Creativity**  A mental process that produces novel responses that contribute to the solutions of problems.

**Critical incident stress debriefing (CISD)**  A specific type of psychological debriefing that follows a strict, step-by-step agenda.

**Critical thinking**  Involves rationally analyzing and evaluating information before drawing conclusions.

**Critical thinking skills**  This book emphasizes six critical thinking skills, based on the following questions: What is the source? Is the claim reasonable or extreme? What is the evidence? Could bias contaminate the conclusion? Does the reasoning avoid common fallacies? Does the issue require multiple perspectives?

**Cross-cultural psychologists**  Those who work in this specialty are interested in how psychological processes may differ among people of different cultures.

**Crystallized intelligence**  The knowledge a person has acquired plus the ability to access that knowledge.

**CT scanning or computed tomography**  A computerized imaging technique that uses X-rays passed through the brain at various angles and then combined into an image.

**Culture**  A complex blend of language, beliefs, customs, values, and traditions developed by a group of people and shared with others in the same environment.

**Cytokines**  Hormone-like chemicals that fight infection and facilitate communication between the brain and immune system.

**Data**  Pieces of information, especially information gathered by a researcher to be used in testing a hypothesis. (Singular: datum.)

**Daydreaming**  A common (and quite normal) variation of consciousness in which attention shifts to memories, expectations, desires, or fantasies and away from the immediate situation.

**Debriefing**   Procedure conducted at end of an experiment in which researcher shares with participants the reasons for the study and the initial findings, and explains reasons for any misleading information.

**Declarative memory**   A division of LTM that stores explicit information; also known as fact memory. Declarative memory has two subdivisions, episodic memory and semantic memory.

**Defending**   Efforts taken to reduce the symptoms of stress or one's awareness of them.

**Defense mechanisms**   Mental processes enacted unconsciously to minimize anxiety arousal in particular situations.

**Dehumanization**   The psychological process of thinking about certain other people or groups as less than human, as like feared or hated animals. A basic process in much prejudice and mass violence.

**Deinstitutionalization**   The policy of removing patients, whenever possible, from mental hospitals.

**Delusion**   An extreme disorder of thinking, involving persistent false beliefs. Delusions are the hallmark of paranoid disorders.

**Dendrite**   Branched fiber that extends outward from the cell body and carries information into the neuron.

**Dependent variable**   The measured outcome of a study; the responses of the subjects in a study.

**Depersonalization**   Depriving people of their identity and individuality by treating them as objects rather than as individuals. Depersonalization can be a result of labeling.

**Depersonalization/derealization disorder**   An abnormality involving the sensation that mind and body have separated, as in an "out-of-body" experience.

**Depressant**   Drug that slows down mental and physical activity by inhibiting transmission of nerve impulses in the central nervous system.

**Depressive disorders**   A group of disorders characterized by diminished pleasure and a low or depressed mood.

**Depressive phase**   In bipolar disorder, a period of depression, unhappiness, and despair—alternating with the manic phase, or period of excitement or elation.

**Depth of processing**   A phenomenon in memory indicating that information processed more deeply, based on meaning, is more likely to be retained.

**Developmental level of analysis**   Concerns changes in the organism's developmental progress that might change motivational priorities.

**Developmental perspective**   One of the six main psychological viewpoints, distinguished by its emphasis on nature and nurture and on predictable changes that occur across the lifespan.

**Developmental psychology**   The psychological specialty that studies how organisms grow and change over time as the result of biological and environmental influences.

**Diathesis–stress hypothesis**   In reference to schizophrenia, the proposal that genetic factors place the individual at risk while environmental stress factors transform this potential into an actual schizophrenic disorder.

**Difference threshold**   The smallest amount by which a stimulus can be changed and the difference be detected half the time.

**Diffusion of responsibility**   Dilution or weakening of each group member's obligation to act when responsibility is perceived to be shared with all group members or accepted by the leader.

**Discrimination**   A negative action taken against an individual as a result of his or her group or categorical membership. It is the behavior that prejudice generates.

**Disenfranchised grief**   The emotion surrounding a loss that others do not support, share, or understand.

**Display rules**   The permissible ways of displaying emotions in a particular society.

**Disposition**   Relatively stable personality pattern, including temperaments, traits, and personality types.

**Dispositional theory**   A general term that includes the temperament, trait, and type approaches to personality.

**Dispositionism**   A psychological orientation that focuses primarily on the inner characteristics of individuals, such as personality dispositions, values, character, and genetic makeup. Contrasted with situationism, the focus is on external causes of behavior.

**Dissociative amnesia**   A psychologically induced loss of memory for personal information, such as one's identity or residence.

**Dissociative disorders**   One of a group of pathologies involving "fragmentation" of the personality, in which some parts of the personality have become detached, or dissociated, from other parts.

**Dissociative fugue**   Essentially the same as dissociative amnesia but with the addition of "flight" from one's home, family, and job. Fugue (pronounced FEWG) means "flight." The *DSM-5* regards dissociative fugue as a form of dissociative amnesia.

**Dissociative identity disorder**   A condition in which an individual displays multiple identities or personalities; formerly called "multiple personality disorder."

**Distress**   The psychological reaction created by external stressors, which can be an emotional, cognitive or behavioral response. It is part of the stress response that also includes biological and physiological reactions to stressors.

**Distributed learning**   A technique whereby the learner spaces learning sessions over time rather than trying to learn the material all in one study period.

**DNA (deoxyribonucleic acid)**   A long, complex molecule that encodes genetic characteristics.

**Dopamine**   A neurotransmitter associated with the brain's reward circuits.

**Double-blind study**   An experimental procedure in which both researchers and participants are uninformed about the nature of the independent variable being administered.

**Downward social comparison**   Comparison between one's own stressful situation and others in a similar situation who are worse off, with the goal of gaining a more positive perspective on one's own situation.

**Drive**   Biologically instigated motivation.

**Drive state**   A motivated condition generated by a *need*, in which behavior is channeled toward meeting the need—as in drinking to quench one's thirst.

**Drive theory**   Developed as an alternative to instinct theory, drive theory explains motivation as a process in which a biological need produces a drive that moves an organism to meet the need. For most drives this process returns the organism to a balanced condition, known as homeostasis.

**DSM-5**   The fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders*, published by the American Psychiatric Association; the most widely accepted psychiatric classification system in the United States.

**Dyslexia**   A reading disability, thought by some experts to involve a brain disorder.

**Ecological view**   A perspective on mental disorder that emphasizes social and cultural context.

**Efferent**   Also known as motor neurons.

**Ego defense mechanism**   A largely unconscious mental strategy employed to reduce the experience of conflict or anxiety.

**Ego**   The conscious, rational part of the personality, charged with keeping peace between the superego and the id.

**Egocentrism**   In Piaget's theory, the inability to realize that there are other viewpoints beside one's own.

**Ego-integrity**   In Erikson's theory, the developmental task of late adulthood—-involving the ability to look back on life without regrets and to enjoy a sense of wholeness.

**EI**   The abbreviation for *emotional intelligence*.

**Eidetic imagery**   An especially clear and persistent form of memory that is quite rare; sometimes known as "photographic memory."

**Elaborative rehearsal**   A working-memory process in which information is actively reviewed and related to information already in LTM.

**Electra complex**   Concept advanced by Carl Jung, highlighting a girl's psychosexual competition with the mother for the father's love, which is resolved in psychoanalytic theory when the girl comes to identify with the same-sex adult. Equivalent to Oedipus complex in males.

**Electroconvulsive therapy (ECT)**   A treatment used primarily for depression and involving the application of an electric current to the head, producing a generalized seizure; sometimes called "shock treatment."

**Electroencephalograph (EEG)**   A device for recording brain waves, typically by electrodes placed on the scalp. The record produced is known as an electroencephalogram (also called an EEG).

**Electromagnetic spectrum**   The entire range of electromagnetic energy, including radio waves, X-rays, microwaves, and visible light.

**Embryo**   In humans, the name for the developing organism during the first 8 weeks after conception.

**Emerging adulthood**   A transition period between adolescence and adulthood.

**Emotion**   A four-part process that involves physiological arousal, subjective feelings, cognitive interpretation, and behavioral expression. Emotions help organisms deal with important events.

**Emotional bias**   The tendency to make judgments based on attitudes and feelings, rather than on the basis of a rational analysis of the evidence.

**Emotional intelligence**   The ability to understand and control emotional responses.

**Emotion-focused coping**   Regulating one's emotional response to a stressor.

**Empathy**   Compassionate understanding.

**Empirical investigation or empirical research**   An approach to research that relies on sensory experience and observation as research data.

**Empirically supported treatment (EST)**   Treatment regimen that has been demonstrated to be effective through research.

**Encoding**   The first of the three basic tasks of memory, involving the modification of information to fit the preferred format for the memory system.

**Encoding specificity principle**   The doctrine that memory is encoded and stored with specific cues related to the context in which it was formed. The more closely the retrieval cues match the form in which the information was encoded, the better it will be remembered.

**Endocrine system**   The hormone system—the body's chemical messenger system, including the endocrine glands: pituitary, thyroid, parathyroid, adrenals, pancreas, ovaries, and testes.

**Endorphins**

**Engram**   The physical changes in the brain associated with a memory. It is also known as the memory trace.

**Epigenetic/epigenetics**   The scientific study of the epigenome; also, changes in DNA as a consequence of new experiences.

**Epigenome**   The lasting record, imprinted on our DNA, of genes that have been activated and deactivated, affecting the subsequent development of the individual.

**Epinephrine (adrenalin)**   A neurotransmitter and a hormone that acts on the nervous system as a stimulant. It is often called *adrenalin*, but the term *epinephrine* is preferred by scientists in the U.S.

**Episodic memory**   A subdivision of declarative memory that stores memory of personal events or "episodes."

**Esteem needs**   In Maslow's hierarchy, *esteem needs* refers to one's desires for a positive self-evaluation, self-liking, self-respect, and self-confidence.

**Evaluative conditioning**   A variant of classical conditioning.

**Evolution**   The gradual process of biological change that occurs in a species as it adapts to its environment.

**Evolutionary psychology**   A relatively new specialty in psychology that sees behavior and mental processes in terms of their genetic adaptations for survival and reproduction.

**Executive function**   Cognitive abilities in the frontal lobes necessary for complex thinking, planning, and goal-directed behavior.

**Exhaustion phase**   Third phase of the GAS, during which the body's resources become depleted.

**Existential courage**   The ability to tolerate ontological (normal) anxiety and seek out new experiences in the search for meaning.

**Existential theories**   Attempt to link the present to an idealized future in the ongoing quest to find meaning in one's existence, and purpose and significance in one's life.

**Expectancy bias**   The researcher allowing his or her expectations to affect the outcome of a study.

**Expectancy-value theory**   A social psychology theory that states how people decide whether to pursue a relationship by weighing the potential value of the relationship against their expectation of success in establishing the relationship.

**Experiment**   A kind of research in which the researcher controls all the conditions and directly manipulates the conditions, including the independent variable.

**Experimental group**   Participants in an experiment who are exposed to the treatment of interest.

**Experimental psychologists**   Psychologists who do research on basic psychological processes—as contrasted with applied psychologists; experimental psychologists are also called research psychologists.

**Experts**   Individuals who possess well–organized funds of knowledge, including the effective problem-solving strategies, in a field.

**Explicit memory**   Memory that has been processed with attention and can be consciously recalled.

**Exposure therapy**   A form of desensitization therapy in which the patient directly confronts the anxiety-provoking stimulus (as opposed to imagining the stimulus).

**External locus of control**   The causes of behavior and our explanations for them can be focused on either internal (within the person) or external (within in the situation) factors.

**Externals**   People with an external locus of control who believe they can do little to influence their life outcomes.

**Extinction (in classical conditioning)**   The weakening of a conditioned response in the absence of an unconditioned stimulus.

**Extinction (in operant conditioning)**   A process by which a response that has been learned is weakened by the absence or removal of reinforcement. (Compare with extinction in classical conditioning.)

**Extraversion**   The Jungian personality dimension that involves turning one's attention outward, toward others.

**Extreme affective disturbances**   Great perturbations in emotional responsiveness, such as pronounced agitation and excitement or, at the other extreme, depression and "flat" emotional response.

**Extrinsic motivation**   The desire to engage in an activity to achieve an external consequence, such as a reward.

**False positive**   Mistaken identification of a person as having a particular characteristic. In polygraphy, a false positive is an erroneous identification of a truthful person as being a liar.

**Family systems theory**   A perspective on personality and treatment that emphasizes the family rather than the individual as the basic unit of analysis .

**Fast response system**   The neural circuitry, deep in the brain, that responds more quickly to emotion-provoking stimuli than the *slow response system* involving the cerebral cortex. The fast response system primarily operates outside of consciousness.

**Feature detectors**   Cells in the cortex that specialize in extracting certain features of a stimulus.

**Fetal alcohol syndrome (FAS)**   A set of physical and mental problems seen in children whose mothers drink excessive amounts of alcohol during pregnancy.

**Fetus**   In humans, the term for the developing organism between the embryonic stage and birth.

**Fight-or-flight response**   Sequence of internal responses preparing an organism for struggle or escape.

**Figure**   The part of a pattern that commands attention. The figure stands out against the ground.

**Five-factor theory**   A trait perspective suggesting that personality is composed of five fundamental personality dimensions (also known as the Big Five): openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism.

**Fixed-action patterns**   Genetically based behaviors, seen across a species, that can be set off by a specific stimulus. The concept of *fixed-action patterns* has replaced the older notion of instinct.

**Fixed interval (FI) schedule**   A program by which reinforcement is contingent upon a certain, fixed time period.

**Fixed ratio (FR) schedule**   A program by which reinforcement is contingent on a certain, unvarying number of responses.

**Flashbulb memory**   A clear and vivid long-term memory of an especially meaningful and emotional event.

**Flow**   In Csikszentmihalyi's theory, an intense focus on an activity accompanied by increased creativity and near-ecstatic feelings. Flow involves intrinsic motivation.

**Fluid intelligence**   The ability to see complex relationships and solve problems.

**FMRI** or **functional magnetic resonance imaging**   A newer form of magnetic resonance imaging that records both brain structure and brain activity.

**Forgetting curve**   A graph plotting the amount of retention and forgetting over time for a certain batch of material, such as a list of nonsense syllables. The typical forgetting curve is steep at first, becoming flatter as time goes on.

**Formal operational stage**   The last of Piaget's stages, during which abstract thought appears.

**Fovea**   The tiny area of sharpest vision in the retina.

**Frequency**   The number of cycles completed by a wave in a second.

**Frontal cortex**   Also known as frontal lobes.

**Frontal lobes**   Cortical regions at the front of the brain that are especially involved in movement and in thinking.

**Fully functioning person**   Carl Rogers's term for a healthy, self-actualizing individual who has a self-concept that is both positive and congruent with reality.

**Functional fixedness**   The inability to perceive a new use for an object associated with a different purpose; a form of mental set.

**Functional level of analysis**   Concerns the adaptive function of a motive in terms of the organism's survival and reproduction.

**Functionalism**   A historical school of psychology that believed mental processes could best be understood in terms of their adaptive purpose and function.

**Fundamental attribution error (FAE)** The dual tendency to overemphasize internal, dispositional causes and minimize external, situational pressures. The FAE is more common in individualistic cultures than in collectivistic cultures.

**G factor** A general ability, proposed by Spearman, as the main factor underlying all intelligent mental activity.

**GABA** The primary inhibitory neurotransmitter in the central nervous system, important for calming fear and anxiety.

**Gate-control theory** An explanation for pain control that proposes we have a neural "gate" that can, under some circumstances, block incoming pain signals.

**Gene** Segment of a chromosome that encodes the directions for the inherited physical and mental characteristics of an organism. Genes are the functional units of a chromosome.

**General Adaptation Syndrome (GAS)** A three-phase pattern of physical responses to a chronic stressor.

**General anesthetic** Substance that suppresses consciousness and awareness of pain. Most anesthetics also produce sedation and immobility.

**Generalized anxiety disorder** A psychological problem characterized by persistent and pervasive feelings of anxiety, without any external cause.

**Generativity** The process of making a commitment beyond oneself to family, work, society, or future generations. In Erikson's theory, generativity is the developmental challenge of midlife.

**Genetic leash** Edward Wilson's term for the constraints placed on development by heredity.

**Genocide** Any national program designed to destroy an entire nation or race of people, as the Nazis enacted toward the Jews in the 1930s and '40s.

**Genome** The complete set of genetic information contained with a cell.

**Genotype** An organism's genetic makeup.

**Gestalt psychology** From a German word (pronounced gush-TAWLT) that means "whole" or "form" or "configuration." (A Gestalt is also a percept.) The Gestalt psychologists believed that much of perception is shaped by innate factors built into the brain.

**Giftedness** Often conceived as representing the upper 2 percent of the IQ range, commencing about 30 points above average (at about 130 IQ points).

**Gist (pronounced *JIST*)** The sense or meaning, as contrasted with the exact details.

**Glial cell** One of the cells that provide structural support for neurons. Glial cells also provide an insulating covering (the myelin sheath) of the axon for some neurons, which facilitates the electrical impulse.

**Goal-directed behavior** An ability that emerges during the sensorimotor period by which infants develop the ability to keep a simple goal in mind as they pursue it.

**Grammar** The rules of a language, specifying how to use the elements of language and word order to produce understandable sentences.

**Grief** The emotional response to loss, which includes sadness, anger, helplessness, guilt, and despair.

**Ground** The part of a pattern that does not command attention; the background.

**Group therapy** Any form of psychotherapy done with more than one client/patient at a time. Group therapy is often done from a humanistic perspective.

**Groupthink** The term for the poor judgments and bad decisions made by members of groups that are overly influenced by perceived group consensus or the leader's point of view.

**Gustation** The sense of taste, from the same word root as "gusto;" also called the gustatory sense.

**H.M.** Henry Molaison, the subject of a case study in memory.

**Habituation** Learning not to respond to the repeated presentation of a stimulus.

**Hallucination** A false sensory experience that may suggest mental disorder. Hallucinations can have other causes, such as drugs or sensory isolation.

**Hallucinogen** A drug that creates hallucinations or alters perceptions of the external environment and inner awareness.

**Hardiness** Attitude of resistance to stress, based on a sense of challenge (welcoming change), commitment (engagement), and control (maintaining an internal guide for action).

**Hassle** Situation that causes minor irritation or frustration.

**Health psychology** Field of psychology that studies psychosocial factors that contribute to promoting health and well being, and also those that influence illness, with the goal of educating the public about developing healthier life styles.

**Heritability** The amount of trait variation within a group raised under the same conditions, which can be attributed to genetic differences. Heritability tells us nothing about between-group differences.

**Heroes** People whose actions help others in emergencies or challenge unjust or corrupt systems, doing so without concern for reward or likely negative consequences for them by acting in deviant ways.

**Heterosexuality** Refers to romantic or erotic attraction to the opposite sex.

**Heuristics** Cognitive strategies or "rules of thumb" used as shortcuts to solve complex mental tasks. Unlike algorithms, heuristics do not guarantee a correct solution.

**Hierarchy of needs** In Maslow's theory, the notion that needs occur in priority order, with the biological needs as the most basic.

**Hindsight bias** The tendency, after learning about an event, to "second guess" or believe that one could have predicted the event in advance.

**Hippocampus** A component of the limbic system, involved in establishing long-term memories.

**Histones** Special proteins that provide the structure for a coiled DNA molecule, much like a spool provides structure for a length of thread wrapped around it.

**Homeostasis** The body's tendency to maintain a biologically balanced condition, especially with regard to nutrients, water, and temperature.

**Homosexuality**    Refers to romantic or erotic attraction to the same sex.

**Hormones**    Chemical messengers used by the endocrine system. Many hormones also serve as neurotransmitters in the nervous system.

**Humanistic psychology**    A clinical approach emphasizing human ability, growth, potential, and free will.

**Humanistic theories**    A group of personality theories that focus on human growth and potential rather than on mental disorders. All emphasize the functioning of the individual in the present rather than on the influence of past events.

**Humanistic therapy**    Treatment technique based on the assumption that people have a tendency for positive growth and self-actualization, which may be blocked by an unhealthy environment that can include negative self-evaluation and criticism from others.

**Humors**    Four body fluids—blood, phlegm, black bile, and yellow bile—that, according to an ancient theory, control personality by their relative abundance.

**Hypnosis**    An induced state of awareness, usually characterized by heightened suggestibility, deep relaxation, and highly focused attention.

**Hypnotizability**    The measured degree to which an individual responds positively to hypnotic suggestions.

**Hypothalamus**    A limbic structure that serves as the brain's blood-testing laboratory, constantly monitoring the blood to determine the condition of the body.

**Hypothesis**    A statement predicting the outcome of a scientific study; a statement predicting the relationship among variables in a study.

**Id**    The primitive, unconscious portion of the personality that houses the most basic drives and stores repressed memories.

**Ideal self**    What a person strives to be, and is constantly changing throughout the life span.

**Identification**    The mental process by which an individual tries to become like another person, especially the same-sex parent.

**Identity**    In Erikson's theory, identity is a sense of who one is—a coherent self. Developing a sense of identity is the main goal of adolescence.

**Illness anxiety disorder**    A somatoform disorder involving excessive concern about health and disease; also called hypochondria.

**Illusion**    You have experienced an illusion when you have a demonstrably incorrect perception of a stimulus pattern, especially one that also fools others who are observing the same stimulus. (If no one else sees it the way you do, you could be having a hallucination.)

**Immunosuppression**    Impairment in the function of the immune system.

**Implicit memory**    A memory that was not deliberately learned or of which you have no conscious awareness.

**Implicit personality theory**    A person's set of unquestioned assumptions about personality, used to simplify the task of understanding others.

**Imprinting**    A primitive form of learning in which some young animals follow and form an attachment to the first moving object they see and hear.

**Inattentional blindness**    A failure to notice changes occurring in one's visual field, apparently caused by narrowing the focus of one's attention.

**Independent variable**    A stimulus condition so named because the experimenter changes it independently of all the other carefully controlled experimental conditions.

**Individualism**    The view, common in the Euro-American world, that places a high value on individual achievement and distinction.

**Industry**    Erikson's term for a sense of confidence that characterizes the main goal of the fourth developmental stage in childhood. Children who do not develop industry (confidence) will slip into a self-perception of inferiority.

**Infancy**    In humans, infancy spans the time between the end of the neonatal period and the establishment of language—usually at about 18 months to 2 years.

**Information-processing model**    A cognitive understanding of memory, emphasizing how information is changed when it is encoded, stored, and retrieved.

**Informational social influence**    Two ways in which people are influenced by others are normative—following social norms about what is desirable and expected behavior in a given situation, versus informational social influence, which is doing what is right according to one's judgment.

**Informed consent**    Ensures that research participants are informed of the procedures of the research, as well as any potential dangers involved, so they may opt out if desired.

**In-group**    The group with which an individual identifies.

**Initiative**    In Erikson's theory, initiative is the major developmental task in the third stage of childhood. Initiative is characterized by the ability to initiate activities oneself, rather than merely responding to others or feeling guilt at not measuring up to others' expectations.

**Innate reflex**    Reflexive response present at birth.

**Insanity**    A legal term, not a psychological or psychiatric one, referring to a person who is unable, because of a mental disorder or defect, to conform his or her behavior to the law.

**Insight learning**    A form of cognitive learning, originally described by the Gestalt psychologists, in which problem solving occurs by means of a sudden reorganization of perceptions.

**Insight therapy**    Psychotherapy in which the therapist helps the patient/client understand (gain insight into) his or her problems.

**Insomnia**    The most common of sleep disorders—involving insufficient sleep, the inability to fall asleep quickly, frequent arousals, or early awakenings.

**Instinct theory**    The now-outmoded view that certain behaviors are completely determined by innate factors. The instinct theory was flawed because it overlooked the effects of learning and because it employed instincts merely as labels rather than as explanations for behavior.

**Instinctive drift**    The tendency of an organism's innate (instinctive) responses to interfere with learned behavior.

**Integration**    A final phase of grieving, in which the loss becomes incorporated into the self.

**Intellectual disability**    Often conceived as representing the lower 2% of the IQ range, commencing about 30 points below average (below about 70 points). More sophisticated definitions also take into account an individual's level of social functioning and other abilities.

**Intelligence**    The mental capacity to acquire knowledge, reason, and solve problems effectively.

**Intelligence quotient (IQ)**    A numerical score on an intelligence test, originally computed by dividing the person's mental age by chronological age and multiplying the result by 100.

**Intermittent reinforcement**    A type of reinforcement schedule by which some, but not all, correct responses are reinforced; also called partial reinforcement.

**Internals**    People with an internal locus of control who believe they can do much to influence their life outcomes.

**Interneuron**    A nerve cell that relays messages between nerve cells, especially in the brain and spinal cord.

**Interpersonal intelligence**    Possessing a high degree of self-awareness.

**Interval schedule**    A program by which reinforcement depends on the time interval elapsed since the last reinforcement.

**Intimacy**    In Erikson's theory, the main developmental task of early adulthood, involving the capacity to make a full commitment—sexual, emotional, and moral—to another person.

**Intrinsic motivation**    The desire to engage in an activity for its own sake rather than for some external consequence, such as a reward.

**Introspection**    The process of reporting on one's own conscious mental experiences.

**Introversion**    The Jungian dimension that focuses on inner experience—one's own thoughts and feelings—making the introvert less outgoing and sociable than the extravert.

**Intuition**    The ability to make judgments without consciously reasoning.

**Inverted U function**    A term that describes the relationship between arousal and performance. Both low and high levels of arousal produce lower performance than does a moderate level of arousal.

**Irreversibility**    The inability, in the preoperational child, to think through a series of events or mental operations and then mentally reverse the steps.

**James–Lange theory**    The proposal that an emotion-provoking stimulus produces a physical response that, in turn, produces an emotion.

**Kinesthetic sense**    The sense of body position and movement of body parts relative to each other (also called kinesthesis).

**Labeling**    Refers to the undesirable practice of attaching diagnoses of mental disorders to people and then using them as stereotypes—treating the afflicted individuals as if the labels explained their whole personalities. Psychiatric labels can also stigmatize people.

**Language acquisition device (LAD)**    A biologically organized mental structure in the brain that facilitates the learning of language because (according to Chomsky) it is innately programmed with some of the fundamental rules of grammar.

**Latent content**    The symbolic meaning of objects and events in a dream. Latent content is usually an interpretation based on Freud's psychoanalytic theory or one of its variants. For example, the latent content of a dream involving clocks might involve fear of the menstrual cycle and, hence, of one's sexuality.

**Lateralization of emotion**    The two brain hemispheres process different emotions. The left hemisphere apparently focuses on positive emotions (for example, happiness), while the right hemisphere deals primarily with negative emotions (such as anger).

**Law of common fate**    The Gestalt principle that we tend to group similar objects together that share a common motion or destination.

**Law of continuity**    The Gestalt principle that we prefer perceptions of connected and continuous figures to disconnected and disjointed ones.

**Law of effect**    The idea that responses that produced desirable results would be learned or "stamped" into the organism.

**Law of Prägnanz**    The most general Gestalt principle, which states that the simplest organization, requiring the least cognitive effort, will emerge as the figure. Prägnanz shares a common root with pregnant, and so it carries the idea of a "fully developed figure." That is, our perceptual system prefers to see a fully developed Gestalt, such as a complete circle—as opposed to a broken circle.

**Law of proximity**    The Gestalt principle that we tend to group objects together when they are near each other. Proximity means "nearness."

**Law of similarity**    The Gestalt principle that we tend to group similar objects together in our perceptions.

**Laws of perceptual grouping**    The Gestalt principles of similarity, proximity, continuity, and common fate. These "laws" suggest how our brains prefer to group stimulus elements together to form a percept (Gestalt).

**Learned helplessness**    A condition in which depressed individuals learn to attribute negative events to their own personal flaws or external conditions that the person feels helpless to change. People with learned helplessness can be thought of as having an extreme form of external locus of control.

**Learned helplessness**    Pattern of failure to respond to threatening stimuli after an organism experiences a series of ineffective responses.

**Learning**    A lasting change in behavior or mental processes that results from experience.

**Learning-based inference**    The view that perception is primarily shaped by learning (or experience), rather than by innate factors.

**Levels-of-processing theory**    The explanation for the fact that information that is more thoroughly connected to meaningful items in long-term memory (more "deeply" processed) will be remembered better.

**Libido**    The Freudian concept of psychic energy that drives individuals to experience sensual pleasure.

**Limbic system**    The middle layer of the brain, involved in emotion and memory. The limbic system includes the hippocampus, amygdala, hypothalamus, and other structures.

**Linguistic intelligence**    Having a high degree of ability with language.

**Locus of control**    A relatively stable pattern of behavior that characterizes individual expectations about the ability to influence the outcomes in life; an individual's sense of whether control over his or her life is internal or external; An individual's sense of whether control over his or her life is internal or external.

**Logical-mathematical intelligence**    Having a high degree of ability with mathematics and logical reasoning.

**Long-term memory (LTM)**    The third of three memory stages, with the largest capacity and longest duration; LTM stores material organized according to meaning.

**Long-term potentiation**    A biological process involving physical changes that strengthen the synapses in groups of nerve cells that is believed to be the neural basis of learning.

**Loudness**    A sensory characteristic of sound produced by the amplitude (intensity) of the sound wave.

**Love, attachment, and affiliation needs**    In Maslow's hierarchy, these are social needs that become prominent when biological and safety needs are met.

**Maintenance rehearsal**    A working-memory process in which information is merely repeated or reviewed to keep it from fading while in working memory. Maintenance rehearsal involves no active elaboration.

**Major depression**    Another term for *major depressive disorder*.

**Major depressive disorder**    A severe form of depressive disorder in which depression is deep and significantly impairs the person's functioning.

**Major depressive disorder with seasonal pattern**    A form of depression believed to be caused b they deprivation of sunlight.

**Manic phase**    In bipolar disorder, a period of excitement or elation, alternating with the *depressive phase*.

**Manifest content**    The story line of a dream, taken at face value without interpretation.

**Matching hypothesis**    The prediction that most people will find friends and mates that are perceived to be of about their same level of attractiveness.

**Maturation**    The process by which the genetic program manifests itself over time.

**Medical model**    The view that mental disorders are diseases that, like ordinary physical diseases, have objective physical causes and require specific treatments.

**Meditation**    A state of consciousness often induced by focusing on a repetitive behavior, assuming certain body positions, and minimizing external stimulation. Meditation may be intended to enhance self-knowledge, well-being, and spirituality.

**Medulla**    A brain-stem structure that controls breathing and heart rate. The sensory and motor pathways connecting the brain to the body cross in the medulla.

**Memory**    Any system—human, animal, or machine—that encodes, stores, and retrieves information.

**Menarche**    The onset of menstruation.

**Mental age (MA)**    The average age at which normal (average) individuals achieve a particular score.

**Mental operation**    Solving a problem by manipulating images in one's mind.

**Mental representation**    The ability to form internal images of objects and events.

**Mental set**    The tendency to respond to a new problem in the manner used for a previous problem.

**Mere exposure effect**    A learned preference for stimuli to which we have been previously exposed.

**Method of loci**    A mnemonic technique that involves associating items on a list with a sequence of familiar physical locations.

**Mimicry**    The imitation of other people's behaviors.

**Mindset**    The extent to which one believes abilities and talents are fixed by nature or can change and grow through practice, and that experience influences success that requires hard work and effort, and also one's reactions to failure.

**Mirror neuron**    A recently discovered class of neuron that fires in response to ("mirroring") observation of another person's actions or emotions.

**Misattribution**    A memory fault that occurs when memories are retrieved but are associated with the wrong time, place, or person.

**Misinformation effect**    The distortion of memory by suggestion or misinformation.

*MMPI-2*    A widely used personality assessment instrument that gives scores on ten important clinical traits; also called the Minnesota Multiphasic Personality Inventory.

**Mnemonic strategy**    Technique for improving memory, especially by making connections between new material and information already stored in long-term memory.

**Moderator**    Factor that helps prevent stressors from causing stress.

**Monocular cues**    Information about depth that relies on the input of just one eye—includes relative size, light and shadow, interposition, relative motion, and atmospheric perspective.

**Mood-congruent memory**    A memory process that selectively retrieves memories that match (are congruent with) one's mood.

**Mood disorders**

**Moral disengagement**    Term developed by Albert Bandura to describe the process by which ordinarily good people can do evil deeds by temporarily suspending their morality.

**Morpheme**    A meaningful unit of language that makes up words. Some whole words are morphemes (example: word); other morphemes include grammatical components that alter a word's meaning (examples: -ed, -ing, and un-).

**Motivation**    Refers to all the processes involved in initiating, directing, and maintaining physical and psychological activities.

**Motor cortex**   A narrow vertical strip of cortex in the frontal lobes lying just in front of the central fissure; controls voluntary movement.

**Motor neuron**   A nerve cell that carries messages away from the central nervous system toward the muscles and glands; also called efferent neurons.

**MRI** or **magnetic resonance imaging**   An imaging technique that relies on cells' responses in a high-intensity magnetic field.

**Müller cells**   Funnel-shaped cells that act much like tiny fiber-optic cables, carrying light through the layers of the retina to the photoreceptor cells (rods and cones) at the back of the eye.

**Multiple intelligences**   A term used to refer to Gardner's theory, which proposes that there are seven (or more) forms of intelligence.

**Musical intelligence**   Having advanced abilities in music.

**Myelin sheath**   A fatty insulation covering many axons in the brain and spinal cord.

**Myers–Briggs Type Indicator (MBTI)**   A widely used personality test based on Jungian types.

**Narcissistic personality disorder**   Condition involving an exaggerated sense of self-importance, a need for constant attention or admiration, and often a preoccupation with fantasies of success or power.

**Narcolepsy**   A disorder of REM sleep, involving sleep-onset REM periods and sudden daytime REM-sleep attacks, usually accompanied by cataplexy.

**Narrative**   A personal account of a stressful event that describes our interpretation of what happened and why.

**Natural concepts**   Mental representations of objects and events drawn from our direct experience.

**Natural language mediator**   Word associated with new information to be remembered.

**Natural selection**   The driving force behind evolution by which the environment "selects" the fittest organisms.

**Naturalistic observation**   A form of descriptive research involving behavioral assessment of people or animals in their natural surroundings.

**Nature–nurture issue**   The long-standing discussion over the relative importance of nature (heredity) and nurture (environment) in their influence on behavior and mental processes.

**Necker cube**   An ambiguous two-dimensional figure of a cube that can be seen from different perspectives: The Necker cube is used here to illustrate the notion that there is no single "right way" to view psychological processes.

**Need**   In drive theory, a need is a biological imbalance (such as dehydration) that threatens survival if the need is left unmet. Biological needs are believed to produce drives.

**Need for achievement (*n Ach*)**   In McClelland's theory, a mental state that produces a psychological motive to excel or to reach some goal.

**Negative correlation**   A correlation coefficient indicating that the variables change simultaneously in opposite directions: As one becomes larger, the other gets smaller.

**Negative punishment**   The removal of an attractive stimulus after a response.

**Negative reinforcement**   The removal of an unpleasant or aversive stimulus, contingent on a particular behavior. Contrast with punishment.

**Neo-Freudian**   Literally "new Freudian" refers to theorists who broke with Freud but whose theories retain a psychodynamic aspect, especially a focus on motivation as the source of energy for the personality.

**Neo-Freudian psychodynamic therapy**   Therapy for a mental disorder that was developed by psychodynamic theorists who embraced some of Freud's ideas but disagreed with others.

**Neonatal period**   In humans, the neonatal (newborn) period extends through the first month after birth.

**Nervous system**   The entire network of neurons in the body, including the central nervous system, the peripheral nervous system, and their subdivisions.

**Neural pathways**   Bundles of nerve cells that follow generally the same route and employ the same neurotransmitter.

**Neurodevelopmental disorders**   A category in the *DSM-5*, referring to cognitive problems that first occur in childhood, including autism spectrum disorder, attention-deficit hyperactivity disorder (ADHD), and dyslexia.

**Neuron**   Cell specialized to receive and transmit information to other cells in the body—also called a nerve cell. Bundles of many neurons are called nerves.

**Neuroscience**   The field devoted to understanding how the brain creates thoughts, feelings, motives, consciousness, memories, and other mental processes.

**Neurosis**   Before the DSM-IV, this term was used as a label for subjective distress or self-defeating behavior that did not show signs of brain abnormalities or grossly irrational thinking.

**Neurotic needs**   Signs of neurosis in Horney's theory, the ten needs are normal desires carried to a neurotic extreme.

**Neurotransmitter**   Chemical messenger that relays neural messages across the synapse. Many neurotransmitters are also hormones.

**Neutral stimulus (NS)**   Any stimulus that produces no conditioned response prior to learning. When it is brought into a conditioning experiment, the researcher will call it a conditioned stimulus (CS). The assumption is that some conditioning occurs after even one pairing of the CS and UCS.

**Night terrors**   Deep sleep episodes that seem to produce terror, although any terrifying mental experience (such as a dream) is usually forgotten on awakening. Night terrors occur mainly in children.

**Nociceptors**   Nerve cells specialize for sensing painful stimuli.

**Nonconscious process**   Any brain process that does not involve conscious processing, including both preconscious memories and unconscious processes.

**Non-REM (NREM) sleep**   The recurring periods, mainly associated with the deeper stages of sleep, when a sleeper is not showing rapid eye movements.

**Normal distribution (or normal curve)**    A bell-shaped curve describing the spread of a characteristic throughout a population.

**Normal range**    Scores falling near the middle of a normal distribution.

**Object permanence**    The knowledge that objects exist independently of one's own actions or awareness.

**Observational learning**    A form of cognitive learning in which new responses are acquired after watching others' behavior and the consequences of their behavior.

**Obsessive–compulsive disorder (OCD)**    A condition characterized by patterns of persistent, unwanted thoughts and behaviors.

**Occipital lobes**    The cortical regions at the back of the brain that house the visual cortex.

**Oedipus complex**    According to Freud, a largely unconscious process whereby boys displace an erotic attraction toward their mother to females of their own age and, at the same time, identify with their fathers.

**Olfaction**    The sense of smell.

**Ontological anxiety**    A normal state of anxiety that comes with venturing into new territory or the unknown.

**Openness**    A positive personal quality of allowing one's self to be openly aware of information that may be challenging to values or beliefs.

**Operant chamber**    A boxlike apparatus that can be programmed to deliver reinforcers and punishers contingent on an animal's behavior. The operant chamber is often called a "Skinner box."

**Operant conditioning**    A form of behavioral learning in which the probability of a response is changed by its consequences—that is, by the stimuli that follow the response.

**Operational definitions**    Objective descriptions of concepts involved in a scientific study. Operational definitions may restate concepts to be studied in behavioral terms (e.g., fear may be operationally defined as moving away from a stimulus). Operational definitions also specify the procedures used to produce and measure important variables under investigation (e.g., "attraction" may be measured by the amount of time one person spends looking at another).

**Opiate**    Highly addictive drug, derived from opium, that can produce a profound sense of well-being and have strong pain-relieving properties.

**Opponent-process theory**    The idea that cells in the visual system process colors in complementary pairs, such as red or green or as yellow or blue. The opponent-process theory explains color sensation from the bipolar cells onward in the visual system.

**Optic nerve**    The bundle of neurons that carries visual information from the retina to the brain.

**Optimism**    An attitude that interprets stressors as external in origin, temporary, and specific in their effects.

**Orbito-frontal cortex (OFC)**    A region in the prefrontal cortex thought to be involved with expectations of reward and punishment, and decision making.

**Out-group**    Those outside the group with which an individual identifies.

**Overjustification**    The process by which extrinsic (external) rewards can sometimes displace internal motivation, as when a child receives money for playing video games.

**Oxytocin**    A hormone produced (by both women and men) in response to a stressor.

**Panic disorder**    A disturbance marked by panic attacks that have no obvious connection with events in the person's present experience. Unlike generalized anxiety disorder, the victim is usually free of anxiety between panic attacks.

**Parallel processing**    Our brain's ability to simultaneously process multiple streams of information.

**Paranoid symptoms**    Unwarranted suspiciousness or delusions

**Paraprofessional**    Individual who has received on-the-job training (and, in some cases, undergraduate training) in mental health treatment in lieu of graduate education and full professional certification.

**Parasympathetic division**    The part of the autonomic nervous system that monitors the routine operations of the internal organs and returns the body to calmer functioning after arousal by the sympathetic division.

**Parietal cortex**    Also known as *parietal lobes*.

**Parietal lobes**    Cortical areas lying toward the back and top of the brain; involved in touch sensation and in perceiving spatial relationships (the relationships of objects in space).

**Participant modeling**    A social learning technique in which a therapist demonstrates and encourages a client to imitate a desired behavior.

**Past-oriented**    A person's behavior may be influenced by a temporal orientation that focuses on the present situation, the anticipated future situation, or on what has been experienced in the past.

**Peer marriage**    Marriage in which the couple see each other as partners and friends, as contrasted with the older stereotypic roles of "husband" and "wife."

**Percept**    The meaningful product of perception—often an image that has been associated with concepts, memories of events, emotions, and motives.

**Perception**    A process that makes sensory patterns meaningful. It is perception that makes these words meaningful, rather than just a string of visual patterns. To make this happen, perception draws heavily on memory, motivation, emotion, and other psychological processes.

**Perceptual constancy**    The ability to recognize the same object as remaining "constant" under different conditions, such as changes in illumination, distance, or location.

**Perceptual set**    Readiness to detect a particular stimulus in a given context—as when a person who is afraid interprets an unfamiliar sound as a threat.

**Peripheral nervous system (PNS)**    All parts of the nervous system lying outside the central nervous system. The peripheral nervous system includes the autonomic and somatic nervous systems.

**Permissive parent**    One of the four parenting styles, characterized by setting few rules and allowing children to make their own decisions. While they may be caring and communicative, permissive parents give most decision-making responsibilities to their children.

**Persistence**   A memory problem in which unwanted memories cannot be put out of mind.

**Personal unconscious**   Jung's term for that portion of the unconscious corresponding roughly to the Freudian id.

**Personality**   The psychological qualities that bring continuity to an individual's behavior in different situations and at different times.

**Personality disorder**   Condition involving a chronic pervasive, inflexible, and maladaptive pattern of thinking, emotion, social relationships, or impulse control.

**Personality process**   The internal working of the personality, involving motivation, emotion, perception, and learning, as well as unconscious processes.

**Personality type**   Similar to a trait, but instead of being a dimension, a type is a category that is believed to represent a common cluster of personality characteristics.

**Person–situation interaction**   Debate over the relative contributions to understanding human behavior from personality processes, like traits, versus social psychological processes, like the power of situational variables.

**PET scanning** or **positron emission tomography**   An imaging technique that relies on the detection of radioactive sugar consumed by active brain cells.

**Phenomenal field**   One's psychological reality, composed of one's perceptions and feelings.

**Phenomenological**   Refers to the belief that the human experience is subjective, and that we all construct our own reality.

**Phenotype**   An organism's observable physical and behavioral characteristics.

**Pheromones**   Chemical signals released by organisms to communicate with other members of their species. Pheromones are often used by animals as sexual attractants. It is unclear whether or not humans employ pheromones.

**Phineas Gage**   Phineas Gage was a railroad worker who experienced an amazing consequence of an exploding metal rod shooting into and out of his skull. He survived, but his personality and basic response style changed dramatically to become more confrontational and emotional.

**Phobia**   One of a group of anxiety disorders involving a pathological fear of a specific object or situation.

**Photoreceptors**   Light-sensitive cells (neurons) in the retina that convert light energy to neural impulses. The photoreceptors are as far as light gets into the visual system.

**Physical dependence**   A process by which the body adjusts to, and comes to need, a drug for its everyday functioning.

**Physical exercise**   Much research documents the importance of daily physical exercise to promote both mental and physical health.

**Physiological arousal**   A heightened state of physical responsiveness, involving neural, hormonal, visceral, and muscular changes resulting from messages sent throughout the autonomic nervous system and the endocrine system.

**Pitch**   A sensory characteristic of sound produced by the frequency of the sound wave.

**Pituitary gland**   The "master gland" that produces hormones influencing the secretions of all other endocrine glands, as well as a hormone that influences growth. The pituitary is attached to the brain's hypothalamus, from which it takes its orders.

**Placebo**   (pla-SEE-bo) Substance that appears to be a drug but is not. Placebos are often referred to as "sugar pills" because they might contain only sugar, rather than a real drug.

**Placebo effect**   A response to a placebo (a fake drug) caused by the belief that it is a real drug.

**Placenta**   The organ interface between the embryo or fetus and the mother. The placenta separates the bloodstreams, but it allows the exchange of nutrients and waste products.

**Plasticity**   The nervous system's ability to adapt or change as a result of experience. Plasticity may also help the nervous system adapt to physical damage.

**Polygraph**   A device that records or graphs many ("poly") measures of physical arousal, such as heart rate, breathing, perspiration, and blood pressure. A polygraph is often called a "lie detector," even though it is really an arousal detector.

**Pons**   A brain-stem structure that regulates brain activity during sleep and dreaming. The name pons derives from the Latin word for "bridge."

**Positive correlation**   A correlation coefficient indicating that the variables change simultaneously in the same direction: As one grows larger or smaller, the other grows or shrinks in a parallel way.

**Positive lifestyle choices**   Deliberate decisions about long-term behavior patterns that increase resistance to both stress and illness.

**Positive psychology**   A recent movement within psychology, focusing on desirable aspects of human functioning, as opposed to an emphasis on psychopathology.

**Positive psychotherapy (PPT)**   A relatively new form of cognitive–behavioral treatment that seeks to emphasize growth, health, and happiness.

**Positive punishment**   The application of an aversive stimulus after a response.

**Positive reinforcement**   A stimulus presented after a response and increasing the probability of that response happening again.

**Positivity**   Having positive evaluations about oneself, one's life, and one's future.

**Postconventional (principled) morality**   Kohlberg's advanced stage of moral reasoning.

**Posttraumatic stress disorder (PTSD)**   A delayed stress reaction in which an individual involuntarily re-experiences emotional, cognitive, and behavioral aspects of past trauma.

**Power of the situation**   The influence of circumstances (the environment) on our attitudes and behavior. People commonly underestimate the power of the situation.

**Practical intelligence**   According to Sternberg, the ability to cope with the environment; sometimes called "street smarts."

**Preconscious**   Freud's notion that the mind has a special unconscious storehouse for information not currently in consciousness but readily available to consciousness. Example: your telephone number is stored in the preconscious.

**Preconventional morality**    Kohlberg's earliest stage of moral reasoning.

**Prefrontal cortex**    The forwardmost section of the frontal lobes, associated with higher-order thinking and personality.

**Prejudice**    A negative attitude toward an individual based solely on his or her membership in a particular group or category, often without any direct evidence.

**Premack principle**    The concept, developed by David Premack, that a more-preferred activity can be used to reinforce a less-preferred activity.

**Prenatal period**    The developmental period before birth.

**Preoperational stage**    The second stage in Piaget's theory, marked by well-developed mental representation and the use of language.

**Preparedness hypothesis**    The notion that we have an innate tendency, acquired through natural selection, to respond quickly and automatically to stimuli that posed a survival threat to our ancestors.

**Present-oriented**    A person's behavior may be influenced by a temporal orientation that focuses on the present situation, the anticipated future situation, or on what has been experienced in the past.

**Primary control**    Efforts aimed at controlling external events.

**Primary reinforcer**    A reinforcer, such as food or sex, that has an innate basis because of its biological value to an organism.

**Priming**    A technique for cuing implicit memories by providing cues that stimulate a memory without awareness of the connection between the cue and the retrieved memory.

**Principle of proximity**    The notion that people at work will make more friends among those who are nearby—with whom they have the most contact. Proximity means "nearness."

**Proactive interference**    A cause of forgetting by which previously stored information prevents learning and remembering new information.im

**Problem-focused coping**    Action taken to clarify and resolve a stressor.

**Procedural memory**    A division of LTM that stores memories for how things are done.

**Projection**    One type of defense mechanism to control anxiety by imagining or attributing the negative attribute to other people.

**Projective test**    Personality assessment instrument, such as the Rorschach and TAT, which is based on Freud's ego defense mechanism of projection.

**Prospective memory**    The aspect of memory that enables one to remember to take some action in the future—as remembering a doctor's appointment.

**Prototype**    An ideal or most representative example of a conceptual category.

**Proximal level of analysis**    Concerns stimuli in the organism's immediate environment that can change motivational priorities. (In humans, *proximal* could also refer to things that the individual is thinking about.)

**Pseudo-psychology**    Erroneous assertions or practices set forth as being scientific psychology.

**Psychiatrists**    Specialists in treating mental disorders who have an M.D. degree and typically prescribe drugs as the primary treatment modality.

**Psychiatry**    A medical specialty dealing with the diagnosis and treatment of mental disorders.

**Psychic determinism**    All human behavior is determined by our inner mental states—by unconscious memories, desires, and conflicts.

**Psychoactive drug**    Chemical that affects mental processes and behavior by its effect on the brain.

**Psychoanalysis**    A method of treating mental disorders that is based on Sigmund Freud's psychoanalytic theory. The goal of psychoanalysis is to release unacknowledged conflicts, urges, and memories from the unconscious. (In common usage, the term often refers broadly both to Freud's psychoanalytic theory and to his psychoanalytic treatment method.)

**Psychoanalytic theory**    Freud's theory of personality and mental disorder.

**Psychodynamic psychology**    A clinical approach emphasizing the understanding of mental disorders in terms of unconscious needs, desires, memories, and conflicts.

**Psychodynamic theory**    A group of theories that originated with Freud. All emphasize motivation—often unconscious motivation—and the influence of the past on the development of mental disorders.

**Psychological debriefing**    Brief, immediate strategy focusing on venting emotions and discussing reactions to a trauma.

**Psychological dependence**    A desire to obtain or use a drug, even though there is no physical dependence.

**Psychological needs**    Another term for the needs operating above the physiological and safety needs in Maslow's hierarchy.

**Psychological therapy**    Therapy based on psychological principles (rather than on the biomedical approach); often called "psychotherapy."

**Psychology**    The science of behavior and mental processes.

**Psychometrics**    The field of "mental measurements." It is the psychological specialty that has given us most of our IQ tests, achievement tests, personality tests, the SAT, and a variety of other assessment instruments.

**Psycho-neuroimmunology**    Multidisciplinary field that studies the influence of mental states on the immune system.

**Psychopathology**    Any pattern of emotions, behaviors, or thoughts inappropriate to the situation and leading to personal distress or the inability to achieve important goals. Other terms having essentially the same meaning include mental illness, mental disorder, and psychological disorder.

**Psychosexual stages**    Successive, instinctive developmental phases in which pleasure is associated with stimulation of different bodily areas at different times of life.

**Psychosis**    A disorder involving profound disturbances in perception, rational thinking, or affect.

**Psychosocial stage**    In Erikson's theory, the developmental stages refer to eight major challenges that appear successively across the lifespan, which require an individual to rethink his or her goals, as well as relationships with others.

**Psychosurgery**    The general term for surgical intervention in the brain to treat psychological disorders.

**Puberty**    The onset of sexual maturity.

**Punishment**    An aversive consequence which, occurring after a response, diminishes the strength of that response. (Contrast with negative reinforcement.)

**Random assignment**    A process used to assign individuals to various experimental conditions by chance alone.

**Ratio schedule**    A program by which reinforcement depends on the number of correct responses.

**Rational–emotive behavior therapy (REBT)**    Albert Ellis's brand of cognitive therapy, based on the idea that irrational thoughts and behaviors are the cause of mental disorders.

**Rationalization**    An ego defense mechanism in which behavior is justified by a seemingly true rationale that attempts to hide the "real" (unconscious) motive.

**Reaction formation**    An ego defense mechanism in which one's actions are just the opposite of the "real" (unconscious) motive. Such behavior is often carried to exaggerated extremes.

**Recall**    A retrieval method in which one must reproduce previously presented information.

**Reciprocal determinism**    The process in which cognitions, behavior, and the environment mutually influence each other.

**Recognition**    A retrieval method in which one must identify present stimuli as having been previously presented.

**Redemptive self**    A common self-narrative identified by McAdams in generative Americans. The redemptive self involves a sense of being called to overcome obstacles in an effort to help others.

**Reflection of feeling**    Carl Rogers's technique of paraphrasing the clients' words, attempting to capture the emotional tone expressed.

**Reflex**    Simple unlearned response triggered by stimuli—such as the knee-jerk reflex set off by tapping the tendon just below your kneecap.

**Regression**    An ego defense mechanism whereby behavior is characteristic of an earlier developmental (psychosexual) stage.

**Reinforcer**    A condition (involving either the presentation or removal of a stimulus) that occurs after a response and strengthens that response.

**Reliability**    An attribute of a psychological test that gives consistent results.

**REM rebound**    A condition of increased REM sleep caused by REM-sleep deprivation.

**REM sleep**    A stage of sleep that occurs approximately every 90 minutes, marked by bursts of rapid eye movements occurring under closed eyelids. REM sleep periods are associated with dreaming.

**Replicate**    In research, this refers to doing a study over to see whether the same results are obtained. As a control for bias, replication is often done by someone other than the researcher who performed the original study.

**Representativeness bias**    A faulty heuristic strategy based on the presumption that, once people or events are categorized, they share all the features of other members in that category.

**Repression**    An unconscious process that excludes unacceptable thoughts and feelings from awareness and memory.

**Resilience**    The capacity to adapt, achieve well-being, and cope with stress, in spite of serious threats to development.

**Resistance phase**    Second phase of the GAS, during which the body adapts to and maintains resources to cope with the stressor.

**Resting potential**    The electrical charge of the axon in its inactive state, when the neuron is ready to "fire."

**Reticular formation**    A pencil-shaped structure forming the core of the brain stem. The reticular formation arouses the cortex to keep the brain alert and attentive to new stimulation.

**Retina**    The thin light-sensitive layer at the back of the eyeball. The retina contains millions of photoreceptors and other nerve cells.

**Retinal ganglion cells**    Neurons in the retina that collect information from the photoreceptors and transmit it via the optic nerve to the brain.

**Retrieval**    The third basic task of memory, involving the location and recovery of information from memory.

**Retrieval cue**    Stimulus used to bring a memory to consciousness or to cue a behavior.

**Retroactive interference**    A cause of forgetting by which newly learned information prevents retrieval of previously stored material.

**Retrograde amnesia**    The inability to remember information previously stored in memory. (Contrast with anterograde amnesia.)

**Reuptake**    The process by which unused neurotransmitters are drawn back into the vesicles of their originating neuron.

**Revolution in aging**    A change in the way people think about aging in modern industrialized nations. This new perspective grows out of increased longevity, better health care, and more lifestyle choices available to older adults. It has also stimulated the psychological study of adult development.

**Reward theory of attraction**    A social learning view that predicts we like best those who give us maximum rewards at minimum cost.

**Rite of passage**    Social ritual that marks the transition between developmental stages, especially between childhood and adulthood.

**Rods**    Photoreceptors in the retina that are especially sensitive to dim light but not to colors. Strange as it may seem, they are rod-shaped.

**Rohrschach Inkblot Technique**    A projective test requiring subjects to describe what they see in a series of 10 inkblots.

**Romantic love**    A temporary and highly emotional condition based on infatuation and sexual desire.

**Rumination**   A pernicious form of negative self-reflection in which a person dwells on depressive thoughts and feelings in response to stress; can compromise the immune system.

**Safety needs**   Refers to conditions threatening survival, found at the second level of Maslow's hierarchy.

**Savant syndrome**   Found in individuals having a remarkable talent (such as the ability to determine the day of the week for any given date) even though they are mentally slow in other domains.

**Scaffolding**   A teaching strategy that emphasizes the role of help from others in providing support for a person's learning.

**Scapegoating**   Blaming an innocent person or a group for one's own troubles and then discriminating against or abusing them.

**Schedule of reinforcement**   A program specifying the frequency and timing of reinforcements.

**Schema**   Cluster of related information that represents ideas or concepts in semantic memory. Schemas provide a context for understanding objects and events; in Piaget's theory, a mental structure or program that guides a developing child's thought.

**Schizophrenia**   (pronounced skits-o-FRENNY-a) A psychotic disorder involving distortions in thoughts, perceptions, and/or emotions.

**Schizotypal personality**   A personality disorder characterized by extreme difficulty with close personal relationships.

*Schlesinger Report*   Report issued by one of the official investigations of the Abu Ghraib Prison abuses, headed by James Schlesinger, former Secretary of Defense. It highlighted the social psychological factors that contributed to creating an abusive environment.

**Scientific method**   A four-step process for empirical investigation of a hypothesis under conditions designed to control biases and subjective judgments.

**Script**   Knowledge about the events, objects, and actions expected in a particular situation.

**Secondary control**   Efforts aimed at controlling one's reactions to external events.

**Secure attachment**   The attachment style of children who are relaxed and comfortable with their caregivers and tolerant of strangers and new experiences—as contrasted with children who are insecurely attached.

**Selective exposure**   Our world is filled with an enormous amount of information on any issue, so sometimes we simplify the search algorithm by focusing only on what supports our views while ignoring contrary evidence—that is selective exposure.

**Selective social interaction**   Choosing to restrict the number of one's social contacts to those who are the most gratifying.

**Self-actualization**   The level of Maslow's hierarchy at which a person is motivated to seek the fullest development of creative human potential.

**Self-actualizing personality**   A healthy individual who has met his or her basic needs and is free to be creative and fulfil his or her potentialities.

**Self-concept**   The relatively stable set of perceptions about oneself.

**Self-consistency bias**   The commonly held idea that we are more consistent in our attitudes, opinions, and beliefs than we actually are.

**Self-control**   The ability to delay instant gratification in pursuit of long-range positive outcomes.

**Self-disclosure**   The sharing of personal information and feelings with another person as part of the process of developing trust.

**Self-esteem**   The emotional component of the self, reflecting one's feelings about his/her overall worth.

**Self-fulfilling prophecy**   Observations or behaviors that result primarily from expectations.

**Self-help support groups**   Groups, such as Alcoholics Anonymous, that provide social support and an opportunity for sharing ideas about dealing with common problems. Such groups are typically organized and run by laypersons, rather than by professional therapists.

**Self-narrative**   The "stories" one tells about oneself. Self-narratives help people sense a thread of consistency through their personalities over time.

**Self-serving bias**   An attributional pattern in which one takes credit for success but denies responsibility for failure. (Compare with fundamental attribution error.)

**Semantic memory**   A subdivision of declarative memory that stores general knowledge, including the meanings of words and concepts.

**Sensation**   The process by which stimulation of a sensory receptor produces neural impulses that the brain interprets as a sound, a visual image, an odor, a taste, a pain, or other sensory image. Sensation represents the first series of steps in processing of incoming information.

**Sensation seekers**   In Zuckerman's theory, individuals who have a biological need for higher levels of stimulation than do most other people.

**Sense making**   One aspect of finding meaning in a stressful situation, which involves perceiving the stressor in a manner consistent with our expectations of the world as predictable, controllable, and nonrandom.

**Sensitive period**   A span of time during which the organism is especially responsive to stimuli of a particular sort. Organisms may have sensitive periods for exposure to certain hormones or chemicals; similarly, they may have sensitive periods for learning language or receiving the visual stimulation necessary for normal development of vision.

**Sensorimotor intelligence**   Piaget's term for the infant's approach to the world, relying on relatively simple physical (motor) responses to sensory experience.

**Sensorimotor stage**   The first stage in Piaget's theory, during which the child relies heavily on innate motor responses to stimuli.

**Sensory adaptation**   Loss of responsiveness in receptor cells after stimulation has remained unchanged for a while, as when a swimmer becomes adapted to the temperature of the water.

**Sensory memory**   The first of three memory stages, preserving brief sensory impressions of stimuli.

**Sensory neuron**   A nerve cell that carries messages toward the central nervous system from sense receptors; also called afferent neurons.

**Separation anxiety**    A common pattern of distress seen in young children when separated from their caregivers.

**Serial position effect**    A form of interference related to the sequence in which information is presented. Generally, items in the middle of the sequence are less well remembered than items presented first or last.

**Serotonin**    A neurotransmitter associated with mood and sleep.

**Set point**    Refers to the tendency of the body to maintain a certain level of body fat and body weight.

**Sex chromosomes**    The X and Y chromosomes that determine our physical sex characteristics.

**Sex drive**

**Sexually objectified**    When a person is perceived as a depersonalized object of sexual desire, emphasizing only physical attributes.

**Sexual orientation**    The direction of one's sexual interests (usually for individuals of the same sex, the opposite sex, or both sexes).

**Sexual response cycle**    The four-stage sequence of arousal, plateau, orgasm, and resolution, occurring in both men and women.

**Shaping**    An operant learning technique in which a new behavior is produced by reinforcing responses that are similar to the desired response.

**Shyness**    A common temperamental condition, but not a disorder, recognized by the *DSM-5*.

**Signal detection theory**    Explains how we detect "signals," consisting of stimulation affecting our eyes, ears, nose, skin, and other sense organs. Signal detection theory says that sensation is a judgment the sensory system makes about incoming stimulation. Often, it occurs outside of consciousness. In contrast to older theories from psychophysics, signal detection theory takes observer characteristics into account.

**Similarity principle**    The notion that people are attracted to those who are most similar to themselves on significant dimensions.

**Situationism**    The view that environmental conditions may influence people's behavior as much as or more than their personal dispositions do under some circumstances.

**Skin senses**    Sensory systems for processing touch, warmth, cold, texture, and pain.

**Sleep apnea**    A respiratory disorder in which the person intermittently stops breathing many times while asleep.

**Sleep debt**    A sleep deficiency caused by not getting the amount of sleep required for optimal functioning.

**Sleep paralysis**    A condition in which a sleeper is unable to move any of the voluntary muscles except those controlling the eyes. Sleep paralysis normally occurs during REM sleep.

**Slow response system**    Brain circuitry of emotion involving the cerebral cortex, which is slower to respond than the *fast response system*. The slow response system involves consciousness.

**Social-cognitive theories**    Focus on the combined, complex set of influences of learning, perception, and social interaction on our current behavior, for better or for worse.

**Social comparison**    A type of cognitive restructuring involving comparisons between oneself and others in similar situations.

**Social context**    The combination of (a) people, (b) the activities and interactions among people, (c) the setting in which behavior occurs, and (d) the expectations and social norms governing behavior in that setting.

**Social distance**    The perceived difference or similarity between oneself and another person.

**Social learning theory**    Developed initially by Albert Bandura, social learning theory states that much human and animal learning occurs in a social context, particularly through observation of others (observational learning). Social learning is a form of cognitive learning that depends heavily on observing others receive rewards or punishments for their actions, rather than on direct consequences for the observer.

**Social neuroscience**    An area of research that uses methodologies from brain sciences to investigate various types of social behavior, such as stereotyping in prejudice, attitudes, self-control, and emotional regulation.

**Social norms**    A group's expectations regarding what is appropriate and acceptable for its members' attitudes and behaviors.

**Social psychology**    The branch of psychology that studies the effects of social variables and cognitions on individual behavior and social interactions.

**Social Readjustment Rating Scale (SRRS)**    Psychological rating scale designed to measure stress levels by attaching numerical values to common life changes.

**Social reality**    An individual's subjective interpretation of other people and of one's relationships with them.

**Social rejection**    A negative personal experience of being socially excluded, banned, shunned, or bullied by others in a social setting.

**Social role**    A socially defined pattern of behavior that is expected of persons in a given setting or group.

**Social support**    Resources others provide to help an individual cope with stress.

**Socialization**    The lifelong process of shaping an individual's behavior patterns, values, standards, skills, attitudes, and motives to conform to those regarded as desirable in a particular society.

**Societal stressor**    A chronic stressor resulting from pressure in one's social, cultural, or economic environment.

**Sociocultural perspective**    A main psychological viewpoint emphasizing the importance of social interaction, social learning, and a culture in explaining behavior.

**Soma**    The part of a cell (such as a neuron) containing the nucleus, which includes the chromosomes; also called the cell body.

**Somatic markers**    The brain's responses to emotion-provoking situations, involving the body's physical responses. Somatic markers may be thought of as physical memories in the brain.

**Somatic nervous system**    A division of the peripheral nervous system that carries sensory information to the central nervous system and also sends voluntary messages to the body's skeletal muscles.

**Somatic symptom and related disorders**   Psychological problem appearing in the form of bodily symptoms or physical complaints, such as weakness or excessive worry about disease. The somatoform disorders include conversion disorder and hypochondriasis.

**Somatosensory cortex**   A strip of the parietal lobe lying just behind the central fissure. The somatosensory cortex is involved with sensations of touch.

**Spatial intelligence**   Advanced abilities in spatial relations.

**Specific phobias**   One of a group of anxiety disorders involving a pathological fear of a specific object or situation.

**Spirituality**   A personal quality and belief system that minimizes the material aspects of life in favor of a higher order force of goodness.

**Spontaneous recovery**   The reappearance of an extinguished conditioned response after a time delay.

**Stage theories**   Explanations of development that emphasize distinctive or rather abrupt changes. A stage theory of cognitive development, then, emphasizes revolutionary changes in thought processes.

**Stages of moral reasoning**   Distinctive way of thinking about ethical and moral problems. According to Kohlberg, moral reasoning progresses through a series of developmental stages that are similar to Piaget's stages of cognitive development.

**Stanford Prison Experiment**   Classic study of institutional power in directing normal, healthy college student volunteers playing randomly assigned roles of prisoners and guards to behave contrary to their dispositional tendencies, as cruel guards or pathological prisoners.

**Stereotype threat**   An expectation of being judged by the standard of a negative stereotype. Such expectations can adversely affect performance. Also the negative effect on performance that arises when an individual becomes aware that members of his or her group are expected to perform poorly in that domain.

**Steroid hormones**   A type of hormone that is prominent in the stress response.

**Stimulant**   A drug that arouses the central nervous system, speeding up mental and physical responses. Stimulants normally increase activity level by encouraging communication among neurons in the brain. Stimulants, however, have been found to suppress activity level in persons with attention-deficit/hyperactivity disorder.

**Stimulus discrimination**   Learning to respond to a particular stimulus but not to stimuli that are similar.

**Stimulus generalization**   The extension of a learned response to stimuli that are similar to the conditioned stimulus.

**Storage**   The second of the three basic tasks of memory, involving the retention of encoded material over time.

**Stress**   The physical and mental response to a stressor.

**Stressor**   A stressful event or situation.

**Structuralism**   A historical school of psychology devoted to uncovering the basic structures that make up mind and thought. Structuralists sought the "elements" of conscious experience.

**Subjective well-being (SWB)**   An individual's evaluative response to life, commonly called happiness, which includes cognitive and emotional reactions.

**Subliminal perception**   The process by which a stimulus that is below the awareness threshold can be sensed and interpreted outside of consciousness.

**Sublimation**   A Freudian ego defense mechanism in which a person's unconscious motive is satisfied by a socially desirable activity.

**Suggestibility**   The process of memory distortion as a result of deliberate or inadvertent suggestion.

**Superego**   The mind's storehouse of values, including moral attitudes learned from parents and from society; roughly the same as the common notion of the conscience.

**Suprachiasmatic nucleus (SCN)**   A tiny region in the hypothalamus that controls our circadian rhythms.

**Survey**   A technique used in descriptive research, typically involving seeking people's responses to a prepared set of verbal or written items.

**Sympathetic division of the autonomic nervous system**   The part of the autonomic nervous system that sends messages to internal organs and glands that help us respond to stressful and emergency situations.

**Synapse**   The microscopic gap that serves as a communications link between neurons. Synapses also occur between neurons and the muscles or glands they serve.

**Synaptic pruning**   The process of trimming unused brain connections, making neurons available for future development.

**Synaptic transmission**   The relaying of information across the synapse by means of chemical neurotransmitters.

**Synchronicity**   The close coordination between the gazing, vocalizing, touching, and smiling of infants and caregivers.

**Synesthesia**   The mixing of sensations across sensory modalities, as in tasting shapes or seeing colors associated with numbers.

**System power**   Influences on behavior that come from top-down sources in the form of creating and maintaining various situations that in turn have an impact on actions of individuals in those behavioral contexts.

**Systematic desensitization**   A behavioral therapy technique in which anxiety is extinguished by exposing the patient to an anxiety-provoking stimulus.

**Tardive dyskinesia**   An incurable disorder of motor control, especially involving muscles of the face and head, resulting from long-term use of antipsychotic drugs.

**Targeted rejection**   The exclusive, active, and intentional social rejection of an individual by others.

**Teachers of psychology**   Psychologists whose primary job is teaching, typically in high schools, colleges, and universities.

**Telegraphic speech**   Short, simple sequences of nouns and verbs without plurals, tenses, or function words like the and of—somewhat like the language once used in telegrams.

**Telomeres**   DNA protein complexes that cap the ends of chromosomes and protect against damage to DNA.

**Temperament**   An individual's characteristic manner of be-havior or reaction—-assumed to have a strong genetic basis.

**Temporal lobes**   Cortical lobes that process sounds, includ-ing speech. The temporal lobes are probably involved in storing long-term memories.

**Tend-and-befriend**   Stress response model proposing that females are biologically predisposed to respond to threat by nurturing and protecting offspring and seeking social support.

**Teratogen**   Substances from the environment, including viruses, drugs, and other chemicals, that can damage the developing organism during the prenatal period.

**Terminal buttons**   Tiny bulblike structures at the end of the axon that contain neurotransmitters that carry the neuron's message into the synapse.

**Terrorism**   A type of disaster caused by human malevolence with the goal of disrupting society by creating fear and danger.

**Thalamus**   The brain's central "relay station," situated just atop the brain stem. Nearly all the messages going into or out of the brain go through the thalamus.

*Thematic Apperception Test (TAT)*   A projective test requir-ing subjects to make up stories that explain ambiguous pictures.

**Theory**   A testable explanation for a set of facts or observa-tions. In science, a theory is not just speculation or a guess.

**Theory of mind**   An awareness that other people's behavior may be influenced by beliefs, desires, and emotions that dif-fer from one's own.

**Therapeutic alliance**   The relationship between the therapist and the client, with both parties working together to help the client deal with mental or behavioral issues.

**Therapy**   A general term for any treatment process; in psychology and psychiatry, therapy refers to a variety of psychological and biomedical techniques aimed at dealing with mental disorders or coping with problems of living.

**Timbre**   The quality of a sound wave that derives from the wave's complexity (combination of pure tones). Timbre comes from the Greek word for "drum" as does the term tympanic membrane or eardrum.

**Time perspective therapy**   A new form of therapy, espe-cially for treatment of PTSD, that highlights the role of temporal factors in causing, maintaining, and modifying behaviors.

**Token economy**   An operant technique applied to groups, such as classrooms or mental hospital wards, involving the distribution of "tokens" or other indicators of reinforcement contingent on desired behaviors. The tokens can later be exchanged for privileges, food, or other reinforcers.

**Tolerance**   The reduced effectiveness a drug has after repeated use.

**Top-down processing**   Perceptual analysis that emphasizes the perceiver's expectations, concept memories, and other cognitive factors, rather than being driven by the charac-teristics of the stimulus. "Top" refers to a mental set in the brain—which stands at the "top" of the perceptual process-ing system.

**TOT phenomenon**   The inability to recall a word, while know-ing that it is in memory. People often describe this frustrating experience as having the word "on the tip of the tongue."

**Trait and temperament psychology**   A psychological per-spective that views behavior and personality as the prod-ucts of enduring psychological characteristics.

**Traits**   Multiple stable personality characteristics that are presumed to exist within the individual and that guide his or her thoughts and actions under various conditions.

**Transcranial magnetic stimulation (TMS)**   A treatment that involves magnetic stimulation of specific regions of the brain. Unlike ECT, TMS does not produce a seizure.

**Transduction**   Transformation of one form of information into another—especially the transformation of stimulus information into nerve signals by the sense organs. As a re-sult of transduction, the brain interprets the incoming light waves from a ripe tomato as red.

**Transgender**   Having a gender identity that is different from one's biological sex, but now chosen as more personally desirable, either feminine or masculine.

**Transience**   The impermanence of a long-term memory. Transience is based on the idea that long-term memories gradually fade in strength over time.

**Transition**   An individual's redefinition or transformation of a life role.

**Traumatic stressor**   A situation that threatens one's physical safety, arousing feelings of fear, horror, or helplessness.

**Triangular theory of love**   Developed by Robert Sternberg, a theory that describes various kinds of love in terms of three components: passion (erotic attraction), intimacy (sharing feelings and confidences), and commitment (dedi-cation to putting this relationship first in one's life).

**Triarchic theory**   The term for Sternberg's theory of intel-ligence; so called because it combines three ("tri-") main forms of intelligence.

**Trichromatic theory**   The idea that colors are sensed by three different types of cones sensitive to light in the red, blue, and green wavelengths. The trichromatic (three-color) theory explains the earliest stage of color sensation. In honor of its originators, this is sometimes called the Young-Helmholtz theory.

**Trust**   The major developmental goal during the first 18 months of life. According to Erikson's theory, the child must choose between trusting or not trusting others.

**Twin study**   A means of separating the effects of nature and nurture by which investigators may compare identical twins to fraternal twins or compare twins separated early in life and raised in different environments.

**Two-factor theory**   The idea that emotion results from the cognitive appraisal of both physical arousal (Factor #1) and an emotion-provoking stimulus (Factor #2).

**Tympanic membrane**   The eardrum.

**Type A**   Behavior pattern characterized by intense, angry, competitive, or hostile responses to challenging situations.

**Tyranny of choice**   The impairment of effective decision making when confronted with an overwhelming number of choices.

**Unconditioned response (UCR)**   In classical conditioning, the response elicited by an unconditioned stimulus without prior learning.

**Unconditioned stimulus (UCS)**   In classical conditioning, UCS is the stimulus that elicits an unconditioned response.

**Unconscious**   In classic Freudian theory, a part of the mind that houses emotional memories, desires, and feelings that would be threatening if brought to consciousness. Many modern cognitive psychologists, however, view the unconscious in less sinister terms, as including all nonconscious mental processes.

**Uninvolved parent**   One of the four parenting styles, characterized by indifference or rejection, sometimes to the point of neglect or abuse.

**Upward social comparison**   Comparison between one's own stressful situation and others in a similar situation who are coping more effectively, with the goal of learning from others' examples.

**Validity**   An attribute of a psychological test that actually measures what it is being used to measure.

**Variable interval (VI) schedule**   A program by which the time period between reinforcements varies from trial to trial.

**Variable ratio (VR) schedule**   A reinforcement program by which the number of responses required for a reinforcement varies from trial to trial.

**Ventromedial prefrontal cortex (VMPFC)**   A portion of the brain, located in the midline, toward the lower (ventral) region of the frontal lobes.

**Vestibular sense**   The sense of body orientation with respect to gravity. The vestibular sense is closely associated with the inner ear and, in fact, is carried to the brain on a branch of the auditory nerve.

**Vicarious traumatization**   Severe stress caused by exposure to traumatic images or stories that cause the observer to become engaged with the stressful material.

**Visible spectrum**   The tiny part of the electromagnetic spectrum to which our eyes are sensitive. The visible spectrum of other creatures may be slightly different from our own.

**Visual cortex**   The visual processing areas of cortex in the occipital and temporal lobes.

**Wave metaphor**   A way of conceptualizing cognitive development, as occurring more gradually—in "waves"—rather than abruptly, as the stage theory suggests.

**Weber's law**   The concept that the size of a JND is proportional to the intensity of the stimulus; the JND is large when the stimulus intensity is high and small when the stimulus intensity is low.

**What pathway**   A neural pathway, projecting from the primary visual cortex to the temporal lobe, that involves identifying objects.

**Where pathway**   A neural pathway that projects visual information to the parietal lobe; responsible for locating objects in space.

**Whole method**   The mnemonic strategy of first approaching the material to be learned "as a whole," forming an impression of the overall meaning of the material. The details are later associated with this overall impression.

**Whole-person perspectives**   A group of psychological perspectives that take a global view of the person: Included are psychodynamic psychology, humanistic psychology, and trait and temperament psychology.

**Wisdom**   According to Sternberg, using one's intelligence toward a common good rather than a selfish pursuit.

**Withdrawal**   A pattern of uncomfortable or painful physical symptoms and cravings experienced by the user when the level of drug is decreased or when the drug is eliminated.

**Work engagement**   An employee's sense of being part of a meaningful work setting where her or his contribution is valued and equitably rewarded (the opposite of job burnout).

**Working memory**   The second of three memory stages and the one most limited in capacity. It preserves recently perceived events or experiences for less than a minute without rehearsal.

**Zero correlation**   When two variables have no relationship to each other.

**Zone of proximal development**   A key idea identifying the difference between what a person can do without help, and what a person can do with a little help. Thought to play a key role in skill building.

**Zygote**   A fertilized egg.

# References

(2010). Lance Armstrong. *Encyclopedia of World Biography.* Retrieved from www.notablebiographies.com/news/A-Ca/Armstrong-Lance.html.

(2010). Lance's bio. Retrieved from http://lancearmstrong.com/.

ABC News. (1995, June 30). My family, forgive me. *20/20,* Transcript #1526, pp. 6–10. New York, NY: American Broadcasting Companies, Inc.

Abelson, R. P. (1981). Psychological status of the script concept. *American Psychologist, 36,* 715–729.

Abrams, A. R. (1992). *Electroconvulsive therapy.* New York, NY: Oxford University Press.

Abrams, M. (2007, June). Born gay? *Discover, 28*(6), 58–83.

Acevedo, R. P., Aron, A., Fisher, H. E., & Brown, L. L. (2011, January 5). Neural correlates of long-term intense romantic love. *Social Cognitive and Affective Neuroscience Advance Access*, 1–15.

Ackerman, J. M., & Bargh, J. A. (2010). The purpose-driven life: Commentary on Kenrick et al. (2010). *Perspectives on Psychological Science, 5,* 323–326.

Ackerman, P. L. (2007). New developments in understanding skilled performance. *Current Directions in Psychological Science, 16,* 235–239.

Ackerman, S. J., Benjamin, L. S., Beutler, L. E., Gelso, C. J., Goldfried, M. R., Hill, C., . . . Rainer, J. (2001). Empirically supported therapy relationships: Conclusions and recommendations of the Division 29 Task Force. *Psychotherapy, 38,* 495–497.

Adams, L. (2010, July 29). Top IVF doctor defends offering help for parents to pick babies' sex. *Daily Record.* Retrieved from Center for Genetics and Society www.geneticsandsociety.org/article.php?id=5316.

Adelson, E. H. (2010). *Checkershadow illusion.* Retrieved from http://persci.mit.edu/gallery/checkershadow

Adelson, R. (2004, July/August). Detecting deception. *Monitor on Psychology, 35*(7), 70–71.

Adelson, R. (2005, July/August). The power of potent steroids. *Monitor on Psychology, 36*(7), 20–22.

Adelson, R. (2006, January). Nationwide survey spotlights U.S. alcohol abuse. *Monitor on Psychology, 37*(1), 30–32.

Adler, J. (2006, March 27). Freud in our midst. *Newsweek, 157*(13), 43–49.

Adolphs, R., Jansari, A., & Tranel, D. (2001). Hemispheric perception of emotional valence from facial expressions. *Neuropsychology, 15,* 516–524.

Adorno, T. W., Frenkel-Brunswick, E., Levinson, D. J., & Sanford, R. N. (1950). *The authoritarian personality.* New York, NY: Harper.

Aftergood, S. (2000, November 3). Polygraph testing and the DOE National Laboratories. *Science, 290,* 939–940. [See also: Holden, 2001b; Saxe, 1991, 1994]

Agras, W. S., Brandt, H. A., Bulik, C. M., Dolan-Sewell, R., Fairburn, C. G., Halmi, K. A., . . . Wilfley, D. E. (2004). Report of the National Institutes of Health workshop on overcoming barriers to treatment research in anorexia nervosa. *International Journal of Eating Disorders, 35,* 509–521.

Ahern, G. L., & Schwartz, G. E. (1985). Differential lateralization for positive and negative emotion in the human brain: EEG spectral analysis. *Neuropsychologia, 23,* 744–755.

Ahrons, C. R. (1994). *The good divorce: Keeping your family together when your marriage comes apart.* New York, NY: HarperCollins.

Aiken, L. R. (1987). *Assessment of intellectual functioning.* Boston, MA: Allyn & Bacon.

Ainsworth, M. D. S. (1989). Attachments beyond infancy. *American Psychologist, 44,* 709–716.

Alanko, K., Santtila, P., Harlaar, N., Witting, K., Varjonen, M., Jern, P., . . . Sandnabba, N. K. (2010). Common genetic effects of gender atypical behavior in childhood and sexual orientation in adulthood: A study of Finnish twins. *Archives of Sexual Behavior, 39,* 81–92.

Albee, G. W. (2006, Fall) Is it time for the Third Force in American psychology? *The General Psychologist, 41*(2), 1–3. Retrieved from www.apa.org/divisions/div1/archive.html.

Alessandri, G., Caprara, G. V., & De Pasacalis, V. (2015). Relations among EEG-alpha asymmetry and positivity personality trait. *Brain and Cognition, 97,* 10–21.

Alferink, L. (2005, Spring). Behaviorism died today, again! *The General Psychologist, 40*(1), 7–8. [Electronic version available at www.apa.org/divisions/div1/newspub.html]

Alison, S. T., & Goethals, G. R., Jr. (2011). *Heroes: Who they are and why we need them.* New York, NY: Oxford University Press.

Allen, K., Blascovich, J., & Mendes, W. B. (2002). Cardiovascular reactivity and the presence of pets, friends, and spouses: The truth about cats and dogs. *Psychosomatic Medicine, 64,* 727–739.

Allen, K., & Morey, M. C. (2010). Physical activity and adherence. In H. Bosworth (Ed.), *Improving patient treatment adherence: A clinician's guide* (pp. 9–38). New York, NY: Springer.

Allen, M. J. (1995). *Introduction to psychological research.* Itasca, IL: Peacock.

Allen, V. S., & Levine, J. M. (1969). Consensus and conformity. *Journal of Experimental Social Psychology, 5,* 389–399.

Allport, G. W. (1954). *The nature of prejudice.* Cambridge, MA: Addison-Wesley.

Allport, G. W., & Odbert, H. S. (1936). Trait-names, a psycho-lexical study. *Psychological Monographs, 47*(1, Whole No. 211).

Almeida, A., Correia, I., & Marinho, S. (2009). Moral disengagement, normative beliefs of peer group, and attitudes regarding roles in bullying. *Journal of School Violence, 9*(1), 23–36.

Alper, J. (1985, March). The roots of morality. *Science, 85,* 70–76.

Alper, J. (1993). Echo-planar MRI: Learning to read minds. *Science, 261,* 556.

Alpert, B., Field, T., Goldstein, S., & Perry, S. (1990). Aerobics enhances cardiovascular fitness and agility in preschoolers. *Health Psychology, 9,* 48–56.

Amabile, T. M. (1983). *The social psychology of creativity.* New York, NY: Springer-Verlag.

Amabile, T. M. (1987). The motivation to be creative. In S. Isaksen (Ed.), *Frontiers in creativity: Beyond the basics.* Buffalo, NY: Bearly Limited.

Amabile, T. M. (2001). Beyond talent: John Irving and the passionate craft of creativity. *American Psychologist, 56,* 333–336.

Amabile, T. M., Hadley, C. N., & Kramer, S. J. (2002, August). Creativity under the gun. *Harvard Business Review, 80*(8), 52–60.

Ambady, N., & Rosenthal, R. (1993). Half a minute: Predicting teacher evaluations from thin slices of non-verbal behavior and physical attractiveness. *Journal of Personality and Social Psychology, 64,* 431–441.

Amedi, A., Merabet, L. B., Bermpohl, F., & Pascual-Leone, A. (2005, December). The occipital cortex in the blind. *Current Directions in Psychological Science, 14,* 306–311.

American Academy of Pediatrics, Subcommittee on Attention Deficit Hyperactivity Disorder, Committee on Quality Improvement. (2001). Clinical practice guideline: Treatment of the school-aged child with attention-deficit/hyperactivity disorder. *Pediatrics, 108,* 1033–1044. [See also: Henker & Whalen, 1989; Poling et al., 1991.]

American Medical Association. (2010). *Stem cell research: Human cloning.* Retrieved from www.ama-assn.org/ama/pub/physician-resources/medical-science/genetics-molecular-medicine/related-policy-topics/stem-cell-research/human-cloning.shtml.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

American Psychological Association. (2002, June 26). *Is corporal punishment an effective means of discipline?* Retrieved from www.apa.org/releases/spanking.html.

American Psychological Association. (2003a). *Careers in psychology for the twenty-first century.* Retrieved October 14, 2004, from www.apa.org/students/brochure/brochurenew.pdf.

American Psychological Association. (2003b). *Council policy manual.* Retrieved from www.apa.org/about/division/cpmscientific.html.

American Psychological Association. (2004, August 5). *The truth about lie detectors (aka polygraph tests).* Retrieved from http://www.apa.org/research/action/polygraph.aspx

American Psychological Association. (2007). Frequently asked questions about teaching high school psychology. Retrieved from www.apa.org/ed/topss/topss_faqs.html.

American Psychological Association. (2010a). *Ethical principles of psychologists and code of conduct.* Retrieved from http://www.apa.org/ethics/code/principles.pdf

American Psychological Association (APA). (2010b). *Lesbian & gay parenting: APA amicus briefs.* Retrieved from www.apa.org/pi/lgbt/resources/parenting.aspx.

American Psychological Association. (2011a). *Careers in psychology.* Retrieved from http://www.apa.org/careers/resources/guides/careers.aspx

American Psychological Association. (2011b, February). *Guidelines for psychological practice with lesbian, gay, and bisexual clients.* Retrieved from http://www.apa.org/pi/lgbt/resources/sexuality-definitions.pdf

American Psychological Association. (2015a). *About prescribing psychologists.* Retrieved from http://www.apapracticecentral.org/advocacy/authority/prescribing-psychologists.aspx

American Psychological Association. (2015b, February 4). American psychological association survey shows money stress weighing on Americans' health nationwide. Retrieved from http://www.apa.org/news/press/releases/2015/02/money-stress.aspx

American Psychological Association Task Force on the Sexualization of Girls. (2007). *Report of the Task Force on the Sexualization of Girls.* Washington, DC: Author.

Anand, K. J. S., & Hickey, P. R. (1987). Pain and its effects in the human neonate and fetus. *The New England Journal of Medicine, 317,* 1321–1329.

Anand, K. J. S., & Scalzo, F. M. (2000). Can adverse neonatal experiences alter brain development and subsequent behavior? *Biology of the Neonate, 77,* 69–82.

Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science, 12,* 353–359.

Anderson, C., Gentile, D., & Buckley, K. (2007). *Violent video game effects on children and adolescents.* London, England: Oxford University Press.

Anderson, J. R. (1982). Acquisition of cognitive skill. *Psychological Review, 89,* 369–406.

Andreasen, N. C. (2008). The relationship between creativity and mood disorders. *Dialogues in Clinical Neuroscience, 10*(2), 251–255.

Andreasen, N. C., Arndt, S., Alliger, R., Miller, D., & Flaum, M. (1995). Symptoms of schizophrenia: Methods, meanings, and mechanisms. *Archives of General Psychiatry, 52,* 341–351.

Andrews, F. M., & Withey, S. B. (1976). *Social indicators of well-being: Americans' perceptions of life quality.* New York, NY: Plenum.

Andrews, J. D. W. (1967). The achievement motive and advancement in two types of organization. *Journal of Personality and Social Psychology, 6,* 163–168.

Andrews, P. W., & Thompson, J. A. (2009). The bright side of being blue: Depression as an adaptation for analyzing complex problems. *Psychological Review, 118,* 620–654.

Andrews, P. W., & Thompson, J. A. (2010, January/February). Depression's evolutionary roots. *Scientific American Mind, 20*(7), 57–61.

Angell, M. (1985). Disease as a reflection of the psyche. *The New England Journal of Medicine, 312,* 1570–1572.

Anglin, J. M. (1993). Vocabulary development: A morphological analysis. *Monographs of the Society for Research in Child Development, 58*(Serial No. 238).

Anglin, J. M. (1995, March). Word learning and the growth of potentially knowable vocabulary. Paper presented at the biennial meetings of the Society for Research in Child Development, Indianapolis, IN.

Angold, A., Erkanli, A., Egger, H. L., & Costello, E. J. (2000). Stimulant treatment for children: A community perspective. *Journal of the American Academy of Child and Adolescent Psychiatry, 39,* 975–984.

Ansbacher, H. L., & Ansbacher, R. R., Eds. (1956). *The individual psychology of Alfred Adler: A systematic presentation in selections from his writings.* New York, NY: Basic Books.

Antonova, I., Arancio, O., Trillat, A-C., Hong-Gang W., Zablow, L., Udo, H., . . . Hawkins, R. D. (2001, November 16). Rapid increase in clusters of presynaptic proteins at onset of long-lasting potentiation. *Science, 294,* 1547–1550.

Antonuccio, D. (1995). Psychotherapy for depression: No stronger medicine. *American Psychologist, 50,* 450–452.

Antony, M. M., Brown, T. A., & Barlow, D. H. (1992). Current perspectives on panic and panic disorder. *Current Directions in Psychological Science, 1,* 79–82.

APA Center for Workforce Studies. (2010). 2010: *Race/Ethnicity of Doctorate Recipients in Psychology in the Past 10 Years.* American Psychological Association. Retrieved from http://www.apa.org/workforce/publications/10-race/index.aspx

APA Practice Directorate Staff. (2014). Illinois law allows psychologists to prescribe. *APA Monitor 45*(8). American Psychological Association.

APA Presidential Task Force on Evidence-Based Practice. (2006). Evidence-based practice in psychology. *American Psychologist, 61,* 271–285.

Archer, D. (2014, May 14). ADHD: The entrepreneur's superpower. *Forbes.*

Archer, D. (2015). *The ADHD advantage: What you thought was a diagnosis may be your greatest strength.* Garden City, NY: Avery.

Arkowitz, H., & Lilienfeld, S. O. (2010, June 24). Sex in bits and bytes: What's the problem? *Scientific American.* Retrieved from http://www.scientificamerican.com/article/sex-in-bits-and-bytes/

Arkowitz, H., & Lilienfeld, S. O. (2011, July/August). Deranged and dangerous? Severe mental illness alone is not generally enough to cause violent behavior. *Scientific American Mind,* 64–65.

Arnett, J. J. (1992). Reckless behavior in adolescence: A developmental perspective. *Developmental Review, 12,* 339–373.

Arnett, J. J. (1997). Young people's conceptions of the transition to adulthood. *Youth & Society, 29,* 1–23.

Arnett, J. J. (1999). Adolescent storm and stress, reconsidered. *American Psychologist, 54,* 317–326.

Arnett, J. J. (2000a). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469–480.

Arnett, J. J. (2000b). High hopes in a grim world: Emerging adults' view of their futures and "Generation X." *Youth & Society, 31,* 267–286.

Arnett, J. J. (2001). Conceptions of the transition to adulthood: Perspectives from adolescence through midlife. *Journal of Adult Development, 8,* 133–144.

Arnsten, A. F. T. (1998, June 12). The biology of being frazzled. *Science, 280,* 1711–1712. [See also Caldwell, 1995; Mukerjee, 1995; Sapolsky, 1990]

Aronson, E. (1978). *The jigsaw classroom.* Beverly Hills, CA: Sage. Retrieved from www.jigsaw.org/history.htm.

Aronson, E. (1997). *Cooperation in the classroom: The jigsaw method* (with Shelley Patnoe). New York, NY: Longman.

Aronson, E. (2000). *Nobody left to hate: Teaching compassion after Columbine.* New York, NY: W. H. Freeman & Company.

Aronson, E. (2004). *The social animal* (9th ed.). New York, NY: Worth. [See also: Feingold, 1990; Tesser & Brodie, 1971]

Aronson, E. (2011). *The social animal* (11th ed.). New York, NY: Worth Publishers.

Aronson, E., Helmreich, R., & LeFan, J. (1970). To err is humanizing—sometimes: Effects of self-esteem, competence, and a pratfall on interpersonal attraction. *Journal of Personality and Social Psychology, 16,* 259–264.

Aronson, E., & Patnoe, S. (1997). *Cooperation in the classroom: The jigsaw method.* New York, NY: Longman.

Aronson, E., Willerman, B., & Floyd, J. (1966). The effect of a pratfall on increasing interpersonal attractiveness. *Psychonomic Science, 4,* 227–228.

Aronson, J., Fried, C. B., & Good, C. (2001). Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *Journal of Experimental Social Psychology, 38,* 1–13.

Asarnow, J., Glynn, S., Pynoos, R. S., Nahum, J., Guthrie, D., Cantwell, D. P., & Franklin, B. (1999). When the earth stops shaking: Earthquake sequelae among children diagnosed for pre-earthquake psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry, 38,* 1016–1025.

Asch, S. E. (1940). Studies in the principles of judgments and attitudes: 11. Determination of judgments by group and by ego standards. *Journal of Social Psychology, 12,* 433–465.

Asch, S. E. (1955). Opinions and social pressure. *Scientific American, 193*(5), 31–35.

Asch, S. E. (1956). Studies of independence and conformity: A minority of one against a unanimous majority. *Psychological Monographs, 70*(9, Whole No. 416).

Aserinsky, E., & Kleitman, N. (1953). Regularly occurring periods of eye mobility and concomitant phenomena during sleep. *Science, 118,* 273–274.

Ashby, F., Isen, A., & Turken, A. (1999). A neuropsychological theory of positive affect and its influence on cognition. *Psychological Review, 106,* 529–550.

Ashby, F. G., & Waldron, E. M. (2000). The neuro-psychological bases of category learning. *Current Directions in Psychological Science, 9,* 10–14. [See also: Beardsley, 1997a; Behrmann, 2000; Freedman et al., 2001; Thorpe & Fabre-Thorpe, 2001]

Association for Psychological Science. (2014, October 30). Toddlers copy their peers to fit in, but apes don't. *Science Daily.*

Athrady, A. (2010, September 8). Pilot was asleep before crash: Black box. *Deccan Herald News Service.* Retrieved from www.deccanherald.com/content/95131/pilot-error-led-air-india.html.

Atkinson, R. C., & Schiffrin, R. M. (1968). Human memory: A control system and its control processes. In K. Spence (Ed.), *The psychology of learning and motivation* (Vol. 2). New York, NY: Academic Press.

Austin, J. H. (1998). *Zen and the brain: Toward an understanding of meditation and consciousness.* Cambridge, MA: MIT Press.

Averill, J. A. (1980). A constructivist view of emotion. In R. Plutchik & H. Kellerman (Eds.), *Emotion: Theory, research, and experience: Vol. 1. Theories of emotion.* New York, NY: Academic Press.

Axel, R. (1995, October). The molecular logic of smell. *Scientific American, 273,* 154–159.

Ayan, S. (2006). Neurotic about neurons. *Scientific American Mind, 17* (2), 36–41.

Ayan, S. (2009, April/May). Laughing matters: Seeing the bright side of life may strengthen the psyche, ease pain and tighten social bonds. *Scientific American, 20*(2), 24–31.

Ayllon, T., & Azrin, N. H. (1965). The measurement and reinforcement of behavior of psychotics. *Journal of Experimental Analysis of Behavior, 8,* 357–383.

Ayllon, T., & Azrin, N. H. (1968). *The token economy: A motivational system for therapy and rehabilitation.* New York, NY: Appleton-Century-Crofts.

Azar, B. (1994, October). Seligman recommends a depression "vaccine." *APA Monitor, 4.* [See also: Robins, 1988; Seligman, 1991; Seligman et al., 1979.]

Azar, B. (1995, June). New cognitive research makes waves. *APA Monitor, 16.*

Azar, B. (1996, November). Some forms of memory improve as people age. *APA Monitor, 27.*

Azar, B. (1997, October). Was Freud right? Maybe, maybe not. *American Psychological Association Monitor, 28,* 30.

Azar, B. (1998a, January). Certain smells evoke stronger memories. *APA Monitor,* 10.

Azar, B. (2002a, January). At the frontier of science. *Monitor on Psychology,* 40–43.

Azar, B. (2002b, September). Searching for genes that explain our personalities. *Monitor on Psychology, 33*(8), 44–45.

Azar, B. (2006, March). The faces of pride. *Monitor on Psychology, 37*(3). Retrieved from www.apa.org/monitor/mar06/pride.html.

Azar, B. (2007, April). A case for angry men and happy women. *Monitor on Psychology, 38*(4), 18–19.

Azar, B. (2010, June). Another reason to break a sweat. *Monitor on Psychology, 41*(6), 36–38.

Babiak, P., & Hare, R. D. (2006). *Snakes in suits: When psychopaths go to work.* New York, NY: HarperCollins.

Babyak, M., Blumenthall, J. A., Herman, S., Khatri, P., Doraiswamy, M., Moore, K., . . . Krishnan, K. R. (2000). Exercise treatment for major depression: Maintenance of therapeutic benefit at 10 months. *Psychosomatic Medicine, 62,* 633–638.

Baddeley, A. (1998). *Human memory: Theory and practice.* Boston, MA: Allyn & Bacon.

Baddeley, A. (2003). Working memory and language: An overview. *Journal of Communication Disorders, 36,* 189–208.

Baddeley, A. (2007). *Working memory, thought, and action.* Oxford, England: Oxford University Press.

Baddeley, A., Gathercole, S., & Papagno, C. (1998). The phonological loop as a language learning device. *Psychological Review*, *105*(1), 158.

Baddeley, A. D. (2000). The episodic buffer: A new component of working memory? *Trends in Cognitive Sciences, 4,* 417–423.

Baddeley, A. D. (2001). Is working memory still working? *American Psychologist, 56,* 851–864.

Baddeley, A. D., & Hitch, G. (1974). Working memory. In G. A. Bower (Ed.), *Recent advances in learning and motivation* (Vol. 8). New York, NY: Academic Press.

Bahrick, H. D. (1984). Fifty years of language attrition: Implications for programmatic research. *Modern language journal, 68,* 105–118.

Bahrick, H. P., Bahrick, L. E., Bahrick, A. S., & Bahrick, P. E. (1993). Maintenance of foreign language vocabulary and the spacing effect. *Psychology Science, 4,* 316–321.

Bahrick, H. P., Bahrick, P. O., & Wittlinger, R. P. (1975). Fifty years of memory for names and faces: A cross-sectional approach. *Journal of Experimental Psychology: General, 104,* 54–75.

Bailey, R. (2006, August 11). Don't be terrorized. *Reason Magazine.* Retrieved from http://reason.com/archives/2006/08/11/dont-be-terrorized.

Baillargeon, R., & DeVos, J. (1991). Object permanence in young infants: Further evidence. *Child Development*, *62,* 1227–1246.

Baker, T. B., McFall, R. M., & Shoham, V. (2008). Current status and future prospects of clinical psychology: Toward a scientifically principled approach to mental and behavioral health care. *Psychological Science in the Public Interest, 9*(2).

Balch, P., & Ross, A. W. (1975). Predicting success in weight reduction as a function of locus of control: A uni-dimensional and multi-dimensional approach. *Journal of Consulting and Clinical Psychology, 43,* 119.

Baldwin, M. W. (1992). Relational schemas and the processing of social information. *Psychological Bulletin, 112,* 461–484.

Baltes, P. B. (1987). Theoretical propositions on lifespan developmental psychology: On the dynamics between growth and decline. *Developmental Psychology, 23,* 611–626.

Baltes, P. B. (1990, November). Toward a psychology of wisdom. Invited address presented at the annual convention of the Gerontological Society of America, Boston, MA.

Baltes, P. B. (1993). The aging mind: Potential and limits. *The Gerontologist, 33,* 580–594.

Baltes, P. B., & Kliegl, R. (1992). Further testing of limits of cognitive plasticity: Negative age differences in a mnemonic skill are robust. *Developmental Psychology, 28,* 121–125.

Baltes, P. B., & Staudinger, U. M. (1993). The search for a psychology of wisdom. *Current Directions in Psychological Science, 2,* 75–80.

Bamshad, M. J., & Olson, S. E. (2003, December). Does race exist? *Scientific American, 289*(6), 78–85. [See also: Gould, 1996; Zuckerman, 1990]

Bandura, A. (1970). Modeling therapy. In W. S. Sahakian (Ed.), *Psychopathology today: Experimentation, theory and research.* Itasca, IL: Peacock.

Bandura, A. (1981). In search of pure unidirectional determinants. *Behavior Therapy, 12,* 30–40.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1992). Exercise of personal agency through the self-efficacy mechanism. In R. Schwarzer (Ed.), *Self-efficacy: Thought control of action* (pp. 3–38). Washington, DC: Hemisphere.

Bandura, A. (1999). Social cognitive theory of personality. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 154–196). New York, NY: Guilford Press.

Bandura, A. (2002). Selective moral disengagement in the exercise of moral agency. *Journal of Moral Education*, *31*(2), 101–119.

Bandura, A., Ross, D., & Ross, S. A. (1963). Imitation of film-mediated aggressive models. *Journal of Abnormal and Social Psychology, 66,* 3–11.

Bandura, A., Underwood, B., & Fromson, M. E. (1975). Disinhibition of aggression through diffusion of responsibility and dehumanization of victims. *Journal of Personality and Social Psychology, 9,* 253–269.

Banich, M. T. (1998). Integration of information between the cerebral hemispheres. *Current Directions in Psychological Science, 7,* 32–37.

Banks, M. S., & Bennet, P. J. (1988). Optical and photoreceptor immaturities limit the spatial and chromatic vision of human neonates. *Journal of the Optical Society of America, 5,* 2059–2079.

Barab, S. A., & Plucker, J. A. (2002). Smart people or smart contexts? Cognition, ability, and talent development in an age of situated approaches to knowing and learning. *Educational Psychologist, 37,* 165–182.

Barach, J. (2003). Reorganization of the brain may provide blind with superior verbal memory. Retrieved from www.bioisrael.com/upload/research/blind_research.doc

Baranowsky, A. B. (2002). The silencing response in clinical practice: On the road to dialogue. In C. R. Figley (Ed.), *Treating compassion fatigue* (pp. 155–170). New York, NY: Brunner-Routledge.

Barash, D. P. (2007, October 5). The targets of aggression. *The Chronicle of Higher Education,* B6–B9.

Barash, D. P. (2012, November 23). The evolutionary mystery of homosexuality. *The Chronicle Review,* B4–B5.

Barbaresi, W. J., Colligan, R. C., Weaver, A. L., Voigt, R. G., Killian, J. M., Katusic, S. K. (2013). Mortality, ADHD, and psychosocial adversity in adults with childhood ADHD: a prospective study. *Pediatrics, 131,* 637–644.

Barber, T. X. (1976). *Hypnosis: A scientific approach.* New York, NY: Psychological Dimensions.

Barber, T. X. (1979). Suggested ("hypnotic") behavior: The trance paradigm versus an alternative paradigm. In E. Fromm & R. E. Shor (Eds.), *Hypnosis: Developments in research and new perspectives.* New York, NY: Aldine.

Barber, T. X. (1986). Realities of stage hypnosis. In B. Zilbergeld, M. G. Edelstein, & D. L. Araoz (Eds.), *Hypnosis: Questions and answers.* New York, NY: Norton.

Barinaga, M. (1997, June 27). New imaging methods provide a better view into the brain. *Science, 276,* 1974–1976.

Barinaga, M. (1998, April 17). Listening in on the brain. *Science, 280,* 376–377.

Barinaga, M. (2002, February 8). How the brain's clock gets daily enlightenment. *Science, 295,* 955–957.

Barinaga, M. (2003, October 3). Studying the well-trained mind. *Science, 302,* 44–46.

Barker, L. M., Best, M. R., & Domjan, M. (Eds.). (1978). *Learning mechanisms in food selection.* Houston: Baylor University Press.

Barkley, R. A. (1998, September). Attention-deficit hyperactivity disorder. *Scientific American, 279*(9), 66–71.

Barkley, R. A. (Ed.). (2014). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment.* New York, NY: Guilford.

Barlett, C. P., & Rodeheffer, C. (2009). Effects of realism on extended violent and nonviolent video game play on aggressive thoughts, feelings, and physiological arousal. *Aggressive Behavior, 35*(3), 213–224.

Barlett, C., Branch, O., Rodeheffer, C., & Harris, R. (2009). How long do the short-term violent video game effects last? *Aggressive Behavior, 35*(3), 225–236.

Barlow, D. H. (1996). Health care policy, psychotherapy research, and the future of psychotherapy. *American Psychologist, 51,* 1050–1058.

Barlow, D. H. (2000). Unraveling the mysteries of anxiety and its disorders from the perspective of emotion theory. *American Psychologist, 55,* 1247–1263.

Barlow, D. H. (2001). A modern learning theory perspective on the etiology of panic disorder. *Psychological Review, 108,* 4–32.

Barlow, D. H. (2004). Psychological treatments. *American Psychologist, 59,* 869–878.

Barlow, D. H. (2010). Negative effects from psychological treatments: A perspective. *American Psychologist, 65,* 13–20.

Barlow, D. H., & Durand, V. M. (2005). *Abnormal psychology: An integrative approach.* Belmont, CA: Wadsworth.

Barlow, J. (2008, February 15). *Parental intervention boosts education of kids at high risk of failure.* Retrieved from http://pmr.uoregon.edu/science-and-innovation/uo-research-news/research-news-2008/february-2008/parental-intervention-boosts-education-of-kids-at-high-risk-of-failure.

Barnes, D. M. (1987). Biological issues in schizophrenia. *Science, 235,* 430–433.

Barnett, R. C., & Hyde, J. S. (2001). Women, men, work, and family: An expansionist theory. *American Psychologist, 56,* 781–796.

Barnier, A. J., & McConkey, K. M. (1998). Posthypnotic responding away from the hypnotic setting. *Psychological Science, 9,* 256–262.

Barnouw, V. (1963). *Culture and personality.* Homewood, IL: Dorsey Press.

Baron, L., & Straus, M. A. (1985). *Four theories of rape in American society: A state-level analysis.* New Haven, CT: Yale University Press.

Baron-Cohen, S., Ring, H. A., Bullmore, E. T., Wheelwright, S., Ashwin, C., & Williams, S. C. R. (2000). The amygdala theory of autism. *Neuroscience and Biobehavioral Reviews, 24,* 355–364.

Barrett, L. F., & Wager, T. D. (2006). The structure of emotion: evidence from neuroimaging studies. *Current Directions in Psychological Science, 15*(2), 79–83.

Barron, F., & Harrington, D. M. (1981). Creativity, intelligence and personality. *Annual Review of Psychology, 32,* 439–476.

Bartels, A., & Zeki, S. (2004). The neural correlates of maternal and romantic love. *NeuroImage, 22,* 419–433.

Bartlett, T. (2011). The case for play. *Chronicle of Higher Education.* Retrieved from http://chronicle.com/article/The-Case-for-Play/126382/.

Bartoshuk, L. (2000). Comparing sensory experiences across individuals: Recent psychophysical advances illuminate genetic variation in taste perception. *Chemical Senses, 25,* 447–460. doi: 10.1093/chemse/25.4.447.

Bartoshuk, L. (2009). *Do you taste what I taste? Some lessons about measurement that impact health.* Presentation given at the American Psychological Association annual convention in Toronto, August, 2009.

Bartoshuk, L. M. (1990, August–September). Psychophysiological insights on taste. *Science Agenda,* 12–13.

Bartoshuk, L. M. (1993). The biological basis of food perception and acceptance. *Food Quality and Preference, 4,* 21–32.

Bartoshuk, L. M., Duffy, V. B., & Miller, I. J. (1994). PCT/PROP tasting: Anatomy, psychophysics and sex effects. *Physiology and Behavior, 56,* 1165–1171.

Basbaum, A. I., & Julius, D. (2006, June). Toward better pain control. *Scientific American, 294*(6), 60–67.

Basic Behavioral Science Task Force of the National Advisory Mental Health Council. (1996). Basic behavioral science research for mental health: Family processes and social networks. *American Psychologist, 51,* 622–630.

Bass, E., & Davis, L. (1988). *The courage to heal.* New York, NY: HarperCollins.

Batson, C. D. (1987). Prosocial motivation: Is it ever truly altruistic? In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 20). Orlando, FL: Academic Press.

Bauer, P. J., Wiebe, S. A., Carver, L. J., Waters, J. M., & Nelson, C. A. (2003). Developments in long-term explicit memory late in the first year of life: Behavioral and electrophysiological indices. *Psychological Science, 14,* 629–635.

Baum, W. M. (1994). *Understanding behaviorism: Science, behavior, and culture.* New York, NY: HarperCollins.

Baumeister, R. F. (Ed.). (1993). *Self-esteem: The puzzle of low self-regard.* New York, NY: Plenum.

Baumeister, R. F. (2005). The unconscious is alive and well, and friendly too. *Journal of Social & Clinical Psychology, 24,* 293–295.

Baumeister, R. F. (2007, August). *Is there anything good about men?* Invited address given at the 2007 APA convention in

San Francisco, CA. Retrieved from www.psy.fsu.edu/~baumeistertice/goodaboutmen.htm.

Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology, 74,* 1252–1265.

Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest, 4,* 1–44.

Baumeister, R. F., Smart, L., & Boden, J. M. (1996). Relation of threatened egotism to violence and aggression: The dark side of high self-esteem. *Psychological Review, 103,* 5–33.

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science, 16,* 351–355.

Baumrind, D. (1967). Child care practices anteceding three patterns of preschool behavior. *Genetic Psychology Monographs, 75,* 43–88.

Baumrind, D. (1971). Current patterns of parental authority. *Developmental Psychology Monograph, 4*(1, Part 2).

Baumrind, D. (1985). Research using intentional deception: Ethical issues revisited. *American Psychologist, 40,* 165–174.

Baynes, K., Eliassen, J. C., Lutsep, H. L., & Gazzaniga, M. S. (1998). Modular organization of cognitive systems masked by interhemispheric integration. *Science, 280,* 902–905.

Beaman, A. L., Barnes, P. J., Klentz, B., & McQuirk, B. (1978). Increasing helping rates through information dissemination: Teaching pays. *Personality and Social Psychology Bulletin, 4,* 406–411.

Beardsley, E. (2010, March 18). *Fake TV game show 'tortures' man, shocks France.* Retrieved from www.npr.org/templates/story/story.php?storyId=124838091.

Beardsley, T. (1996, July). Waking up. *Scientific American, 14,* 18.

Beardsley, T. (1997, March). Memories are made of . . . *Scientific American,* 32–33.

Beardsley, T. (1997a, August). The machinery of thought. *Scientific American, 277,* 78–83.

Beasley, M., Thompson, T., & Davidson, J. (2003). Resilience in response to life stress: The effects of coping style and cognitive hardiness. *Personality and Individual Differences, 34,* 77–95.

Bechara, A., Tranel, D., Damasio, H., Adolphs, R., Rockland, C., & Damasio, A. R. (1995, August 25). Double dissociation of conditioning and declarative knowledge relative to the amygdala and hippocampus in humans. *Science, 269,* 1115–1118.

Beck, A. T. (1976). *Cognitive therapy and emotional disorders.* New York, NY: International Universities Press.

Beck, A. T. (2005). The current state of cognitive therapy: A 40-year retrospective. *Archives of General Psychiatry, 62,* 953–959.

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression.* New York, NY: Guilford Press.

Beck, H. P., Levinson, S., & Irons, G. (2009). Finding little Albert: A journey to John B. Watson's infant laboratory. *American Psychologist, 64*(7), 605–614.

Beck, M. R., Angelone, B. L., & Levin, D. T. (2004). Knowledge about the probability of change affects change detection performance. *Journal of Experimental Psychology: Human Perception and Performance, 30,* 778–791.

Becker, D. V., Kenrick, D. T., Neuberg, S. L., Blackwell, K. C., & Smith, D. M. (2007). The confounded nature of angry men and happy women. *Journal of Personality and Social Psychology, 92,* 179–190.

Bédard, J., & Chi, M. T. H. (1992). Expertise. *Current Directions in Psychological Science, 1,* 135–139.

Bee, H. (1994). *Lifespan development.* New York, NY: HarperCollins.

Behrmann, M. (2000). The mind's eye mapped onto the brain's matter. *Current Directions in Psychological Science, 9,* 50–54.

Beigel, A., & Berren, M. R. (1985). Human-induced disasters. *Psychiatric Annals, 15,* 143–150.

Beilin, H. (1992). Piaget's enduring contribution to developmental psychology. *Developmental Psychology, 28,* 191–204.

Bell, L. (2010, July 3). Fat chance: Scientists are working out ways to rev up the body's gut-busting machinery. *Science News, 178*(1), 18–21. doi: 10.1002/scin.5591780122.

Bem, D. J., & Allen, A. (1974). On predicting some of the people some of the time: The search for cross-situational consistencies in behavior. *Psychological Review, 81*(6), 506–520.

Benassi, V. A., Sweeney, P. D., & Dufour, C. L. (1988). Is there a relation between locus of control orientation and depression? *Journal of Abnormal Psychology, 97,* 357–367.

Benedetti, F., Mayberg, H. S., Wager, T. D., Stohler, C. S., & Zubieta, J. (2005, November 9). Neuro biological mechanisms of the placebo effect. *The Journal of Neuroscience, 25,* 10390–10402.

Benedict, R. (1934). *Patterns of culture.* New York, NY: Houghton Mifflin.

Benjamin, L. T., Jr., & Nielsen-Gammon, E. (1999). B. F. Skinner and psychotechnology: The case of the heir conditioner. *Review of General Psychology, 3,* 155–167.

Bennett, K. K., & Elliott, M. (2002). Explanatory style and health: Mechanisms linking pessimism to illness. *Journal of Applied Social Psychology, 32,* 1508–1526.

Benson, E. (2002, October). Pheromones, in context. *Monitor on Psychology, 33*(9), 46–49. [See also: Azar, 1998b; Holden, 1996b]

Benson, E. (2003, February) Intelligent intelligence testing. *Monitor on Psychology, 34*(2), 48–51.

Benson, H. (1975). *The relaxation response.* New York, NY: Morrow.

Benzeval, M., Green, M. J., & Macintyre, S. (2013). Does perceived physical attractiveness in adolescence predict better socioeconomic position in adulthood? Evidence from 20 years of follow up in a population cohort study. *PLoS One, 8*(5), e63975.

Berenson, A. (2008, February 24). Daring to think differently about schizophrenia. *New York Times.* Retrieved from www.nytimes.com/2008/02/24/business/24drug.html.

Berglas, S. (2001). *Reclaiming the fire: How successful people overcome burnout.* New York, NY: Random House.

Berk, L. (2002). *Infants, children, and adolescents* (4th ed.). Boston, MA: Allyn & Bacon.

Berk, L. E. (2004). *Development through the lifespan* (4th ed.). Boston, MA: Allyn & Bacon.

Berk, L. E. (2007). *Development through the lifespan,* (4th ed.) Boston, MA: Allyn & Bacon.

Berkman, L. F., & Syme, S. L. (1979). Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology, 109,* 186–204.

Berman, B. A., & Dismukes, R. K. (2006). Pressing the approach: A NASA study of 19 recent accidents yields a new perspective on pilot error. *Aviation Safety World,* 28–33.

Berman, J. S., & Norton, N. C. (1985). Does professional training make a therapist more effective? *Psychological Bulletin, 98,* 401–407.

Bernays, E. L. (1923). *Crystallizing public opinion.* New York, NY: Boni & Liveright.

Bernays, E. L. (1928). *Propaganda.* New York, NY: Horace Liveright.

Berns, G. S. Chappelow, J., Zink, C. F., Pagnoni, G., Martin-Skurski, E. M., & Richards, J. (2005). Neurobiological correlates of social conformity and independence during mental rotation. *Biological Psychiatry, 58,* 245–253. [See also: www.nytimes.com/2005/06/28/science/28brai.html.]

Bernstein, I. L. (1988). What does learning have to do with weight loss and cancer? *Proceedings of the Science and Public Policy Seminar of the Federation of Behavioral, Psychological and Cognitive Sciences.* Washington, DC.

Bernstein, I. L. (1990). Salt preference and development. *Developmental Psychology, 26,* 552–554.

Bernstein, I. L. (1991). Aversion conditioning in response to cancer and cancer treatment. *Clinical Psychology Review, 11,* 185–191.

Berry, J. (1992). Cree conceptions of cognitive competence. *International Journal of Psychology, 27,* 73–88.

Berry, J. W., Poortinga, Y. H., Segall, M. H., & Dasen, P. R. (1992). *Cross-cultural psychology: Research and applications.* New York, NY: Cambridge University Press.

Berscheid, E. (1999). The greening of relationship science. *American Psychologist, 54,* 260–266.

Beutler, L. E., & Machado, P. P. (1992). Research on psychotherapy. In M. R. Rosenzweig (Ed.), *Inter national psychological science: Progress, problems, and prospects* (pp. 227–252). Washington, DC: American Psychological Association.

Beverley, R., Meldrum, L., & McFarlane, A. C. (1995). Does debriefing after psychological trauma work? *British Medical Journal, 310,* 1479–1480.

Bevins, R. A. (2001). Novelty seeking and reward: Implications for the study of high-risk behaviors. *Current Directions in Psychological Science, 10,* 189–193.

Bhattacharjee, Y. (2008, January 25). Shell shock revisited: Solving the puzzle of blast trauma. *Science, 319,* 406–408.

Biais, B., & Weber, M. (2009). Hindsight bias, risk perception, and investment performance. *Management Science, 55,* 1018–1029.

Bianchi, E. (1994). *Elder wisdom: Crafting your elderhood.* New York, NY: Crossroad.

Bianchi, S. M., & Spain, D. (1996). Women, work, and family in America. *Population Bulletin, 51,* 1–48.

Bicklen, D. (1990). Communication unbound: Autism and praxis. *Harvard Educational Review, 60*(3), 291–314.

Biederman, I. (1989). Higher-level vision. In D. N. Osherson, H. Sasnik, S. Kosslyn, K. Holler-bach, E. Smith, & N. Block (Eds.), *An invitation to cognitive science.* Cambridge, MA: MIT Press.

Biehl, M., Matsumoto, D., Ekman, P., Hearn, V., Heider, K., Kudoh, T., & Ton, V. (1997). Matsumoto and Ekman's Japanese and Caucasian facial expressions of emotion (JACFEE): Reliability data and cross-national differences. *Journal of Non-verbal Behavior, 21,* 3–21. [See also: Ekman et al., 1987; Izard, 1994]

Billings, A. G., & Moos, R. H. (1985). Life stressors and social resources affect posttreatment outcomes among depressed patients. *Journal of Abnormal Psychology, 94,* 140–153.

Binet, A. (1911). *Les idées modernes sur les enfants.* Paris, France: Flammarion.

Binitie, A. (1975). A factor-analytical study of depression across cultures (African and European). *British Journal of Psychiatry, 127,* 559–563.

Bink, M. L., & Marsh, R. L. (2000). Cognitive regularities in creative activity. *Review of General Psychology, 4,* 59–78.

Bird, S. J. (2005). *The ethics of using animals in research.* Case Western Reserve University. Retrieved from http://online-ethics.org/reseth/mod/animalres.html.

Bjork, R. (1991, November). How do you improve human performance? *APS Observer,* 13–15.

Bjork, R. A. (2000). *Creating desirable difficulties for the learner. Implications for theory and practice.* Address given at the American Psychological Society's annual convention, Miami Beach, FL.

Bjorklund, D. F., & Shackelford, T. K. (1999). Differences in parental investment contribute to important differences between men and women. *Current Directions in Psychological Science, 8,* 86–89.

Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78,* 246–263. doi: 10.1111/j.1467-8624.2007.00995.x

Blakeslee, S. (2005, November 22). This is your brain under hypnosis. *New York Times.* Retrieved from www.nytimes.com/2005/11/22/science/22hypno.html [See also: Kirsch & Lynn, 1995; Woody & Sadler, 1998]

Blanchard, R. (2008). Review and theory of handedness, birth order, and homosexuality in men. *Laterality: Asymmetries of Body, Brain and Cognition, 13,* 51–70. [See also: Blanchard & Bogaert, 1996.]

Blass, T. (1996). Experimental invention and controversy: The life and work of Stanley Milgram. *The General Psychologist, 32,* 47–55.

Blass, T. (2004). *The man who shocked the world: The life and legacy of Stanley Milgram.* New York, NY: Basic Books.

Blatt, S. J., Sanislow, C. A. III, & Pilkonis, P. A. (1996). Characteristics of effective therapists: Further analyses of data from the National Institute of Mental Health treatment of depression collaborative research program. *Journal of Consulting and Clinical Psychology, 64,* 1276–1284.

Blum, D. (2002). *Love at Goon Park: Harry Harlow and the science of affection.* New York, NY: Perseus Publishing.

Blum, D. (2011, October) The scent of your thoughts. *Scientific American,* 54–57.

Blumenthal, J. A., Babyak, M. A., Doraiswamy, P. M., Watkins, L., Hoffman, B. M., Barbour, K. A., . . . Sherwood, A. (2007). Exercise and pharmacotherapy in the treatment of major depressive disorder. *Psychosomatic Medicine, 69*(7), 587–596.

Boahen, K. (2005, May). Neuromorphic microchips. *Scientific American, 292*(5), 56–63.

Board on Children, Youth, and Families (BCYF). (2009). Report brief for researchers: Preventing mental, emotional, and behavioral disorders among young people: Progress and possibilities. Retrieved from www.bocyf.org/prevention_researchers_brief.pdf.

Bocchiaro, P., & Zimbardo, P. G. (2010). Defying unjust authority: An exploratory study. *Current Psychology, 29*(2), 155–170.

Bogaert, A. F. (2005). Sibling sex ratio and sexual orientation in men and women: New tests in two national probability

samples. *Archives of Sexual Behavior, 34,* 111–116. doi: 10.1007/s10508-005-1005-9.

Bogaert, A. F. (2006, July 11). Biological versus non-biological older brothers and men's sexual orientation. *Proceedings of the National Academy of Sciences, 103,* 10771–10774.

Bolger, M. A. (1997). An exploration of college student stress. *Dissertation Abstracts International, 58,* 5-A, 1597.

Bolger, N., DeLongis, A., Kessler, R. C., & Schilling, E. A. (1989). Effects of daily stress on negative mood. *Journal of Personality and Social Psychology, 57,* 808–818.

Bonanno, G. A. (2009). *The other side of sadness: What the new science of bereavement tells us about life after loss.* New York, NY: Basic Books.

Bonanno, G. A., & Mancini, A. D. (2008). The human capacity to thrive in the face of extreme adversity. *Pediatrics, 121,* 369–375.

Bonanno, G. A., Papa, A., Lalande, K., Westphal, M., & Coifman, K. (2004). The importance of being flexible: The ability to both enhance and suppress emotional experession predicts long-term adjustment. *Psychological Science, 15,* 482–487.

Bond, C. F., Jr., & Atoum, A. O. (2000). International deception. *Personality and Social Psychology Bulletin, 26,* 385–395.

Booth, F. W., Gordon, S. E., Carlson, C. J., & Hamilton, M. T. (2000). Waging war on modern chronic diseases: Primary prevention through exercise biology. *Journal of Applied Physiology, 88,* 774–787.

Bornstein, R. F. (1989). Exposure and affect: Overview and meta-analysis of research, 1968–1987. *Psychological Bulletin, 106,* 265–289.

Bornstein, R. F. (2001). The impending death of psychoanalysis. *Psychoanalytic Psychology, 18,* 3–20. [See also: Bruner, 1992; Erdelyi, 1992; Greenwald, 1992; Jacoby et al., 1992; Kihlstrom et al., 1992; Loftus & Klinger, 1992.]

Borod, C., Koff, E., Lorch, M. P., Nicholas, M., & Welkowitz, J. (1988). Emotional and non-emotional facial behavior in patients with unilateral brain damage. *Journal of Neurological and Neurosurgical Psychiatry, 5,* 826–832.

Bostwick, J. M., & Bucci, J. A. (2008). Internet sex addiction treated with naltrexone. *Mayo Clinic Proceedings, 83*(2), 226–230.

Bostwick, J. M., & Pankratz, V. S. (2000). Affective disorders and suicide risk: A reexamination. *American Journal of Psychiatry, 157,* 1925–1932.

Bosveld, J. (2007, December). Sleeping like a hunter-gatherer. *Discover, 28*(12), 66–67.

Botvinick, M. (2004, August 6). Probing the neural basis of body ownership. *Science, 305,* 782–783.

Bouchard, T. J., Jr. (1994, June 17). Genes, environment, and personality. *Science, 264,* 1700–1701.

Bouchard, T. J., & McGue, M. (2003). Genetic and environmental influences on human psychological differences. *Journal of Neurobiology, 54,* 4–45.

Bouchard, T. J., Lykken, D. T., McGue, M., Segal, N. L., & Tellegen, A. (1990). Sources of human psychological differences: The Minnesota study of twins reared apart. *Science, 250,* 223–228.

Boule, N. G., Haddad, E., Kenny, G. P., Wells, G. A., & Sigal, R. J. (2001). Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus: A meta-analysis of controlled clinical trials. *JAMA, 286,* 1218–1227.

Bowden, C. L., Calabrese, J. R., McElroy, S. L., Gyulai, L., Wassef, A., Petty, F., . . . Wozniak, P. J. (2000). A randomized, placebo-controlled 12-month trial of divalproex and lithium in treatment of outpatients with bipolar I disorder. Divalproex Maintenance Study Group. *Archives of General Psychiatry, 57,* 481–489.

Bower, B. (1992, August 22). Genetic clues to female homosexuality. *Science News, 142,* 117.

Bower, B. (1995a, December 23 & 30). Trauma disorder high, new survey finds. *Science News, 148,* 422.

Bower, B. (1995b, March 4). Virus may trigger some mood disorders. *Science News, 147,* 132.

Bower, B. (1996, April 27). Mom–child relations withstand day care. *Science News, 149,* 261.

Bower, B. (1997a, October 18). My culture, my self: Western notions of the mind may not translate to other cultures. *Science News, 152,* 248–249.

Bower, B. (1998b, November 28). Dr. Freud goes to Washington. *Science News, 154,* 347–349.

Bower, B. (1998c, June 20). Psychology's tangled web. *Science News, 153,* 394–395.

Bower, B. (2000a, January 22). Cultures of reason: Thinking styles may take Eastern and Western routes. *Science News, 157,* 56–58.

Bower, B. (2000b, September 30). Memory echoes in brain's sensory terrain. *Science News, 158,* 213.

Bower, B. (2003, April 19). Words get in the way: Talk is cheap, but it can tax your memory. *Science News, 163,* 250–251. [See also Dodson et al., 1997]

Bower, B. (2004, July 24). Suicide watch: Antidepressants get large-scale inspection. *Science News, 166,* 51.

Bower, B. (2005a, November 5). Questions on the couch: Researchers spar over how best to evaluate psychotherapy. *Science News, 168,* 299–301.

Bower, B. (2005b, March 19). Schizophrenia syncs fast: Disconnected brain may lie at heart of disorder. *Science News, 167,* 180.

Bower, B. (2006a, July 1). Gay males' sibling link: Men's homosexuality tied to having older brothers. *Science News, 170*(1), 3.

Bower, B. (2006b, March 18). Prescription for controversy: Medications for depressed kids spark scientific dispute. *Science News, 169,* 168–172.

Bower, B. (2006c, February 11). Self-serve brains: Personal identity veers to the right hemisphere. *Science News, 169,* 90–92. [See also: Botvinick, 2004; Zimmer, 2005.]

Bower, B. (2007, July 28). Antidepressants trim suicide tries. *Science News, 172,* 61. [See also: Gibbons et al., 2007; Simon & Savarino, 2007]

Bower, B. (2009, February 14). Neural circuits foster oversensitivity: Borderline personality patients activate brain in specific ways. *Science News, 175*(4), 13.

Bower, B. (2010a, May 22). Dream a little dream of recall. *Science News, 177*(11), 12–13.

Bower, B. (2010b, June 19). Young kids can't face up to disgust. *Science News, 177*(13), 10.

Bower, G. H. (1972). A selective review of organizational factors in memory. In E. Tulving & W. Donaldson (Eds.), *Organization of memory.* New York, NY: Academic Press.

Bower, J. M., & Parsons, L. M. (2003, August). Rethinking the "lesser brain." *Scientific American,* 50–57.

Bower, T. G. R. (1971, October). The object in the world of the infant. *Scientific American, 225*(4), 30–39.

Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment.* New York, NY: Basic Books.

Bowlby, J. (1973). *Attachment and loss: Vol. 2. Separation, anxiety and anger.* London, England: Hogarth.

Bowles, A. (2004). Beck in action: Grawemeyer-winning psychiatrist influential in psychology. *APS Observer, 17*(3), 7–8.

Boyatzis, C., Matillo, G., & Nesbitt, K. (1995). Effects of *The Mighty Morphin' Power Rangers* on children's aggression with peers. *Child Study Journal, 25,* 45–55.

Boyce, C .J., Wood, A., Daly, M., & Sedikides, C. (2015). Personality change following unemployment., *Journal of Applied Psychology, 100*(4), 991–1011.

Boyd, J., & Zimbardo, P. (2008). *The time paradox*. New York, NY: Simon & Schuster.

Bradbury, J. (2001, May 19). Teasing out the genetics of bipolar disorder. *Lancet, 357,* 1596.

Bradley, G. W. (1978). Self-serving biases in the attribution process: A re-examination of the fact or fiction question. *Journal of Personality and Social Psychology, 35,* 56–71.

Bradshaw, G. (1992). The airplane and the logic of invention. In R. N. Giere (Ed.), *Minnesota studies in the philosophy of science* (pp. 2239–2250). Minneapolis: University of Minnesota Press.

Brådvik, L., & Berglund, M. (2006). Long-term treatment and suicidal behavior in severe depression: ECT and antidepressant pharmacotherapy may have different effects on the occurrence and seriousness of suicide attempts. *Depression and Anxiety, 23,* 34–41.

Brannon, L. (2008). *Gender: Psychological perspectives* (5th ed.). Boston, MA: Allyn & Bacon.

Breckenridge, J. N., & Zimbardo, P. G. (2006). The strategy of terrorism and the psychology of mass-mediated fear. In B. Bongar, L. M. Brown, L. Beutler, J. N. Breckenridge, & P. G. Zimbardo (Eds.), *Psychology and terrorism* (pp. 116–133). New York, NY: Oxford University Press.

Breggin, P. R. (1979). *Electroshock: Its brain-disabling effects.* New York, NY: Springer.

Breggin, P. R. (1991). *Toxic psychiatry.* New York, NY: St. Martin's Press.

Breggin, P. R., & Breggin, G. R. (1994). *Talking back to Prozac.* New York, NY: St. Martin's Press.

Brehm, S. S. (1992). *Intimate relationships* (2nd ed.). Boston, MA: McGraw-Hill.

Brehm, S. S., Miller, R., Perlman, D., & Campbell, S. M. (2002). *Intimate relationships* (3rd ed.). New York, NY: McGraw-Hill.

Breier, J. I., Simos, P. G., Fletcher, J. M., Castillo, E. M., Zhang, W., & Papanicolaou, A. C. (2003). Abnormal activation of temporoparietal language areas during phonetic analysis in children with dyslexia. *Neuropsychology, 17,* 610–621.

Breland, K., & Breland, M. (1961). The misbehavior of organisms. *American Psychologist, 16,* 681–684.

Brengman, M., Wauters, B., Macharis, C., & Mairesse, O. (2010). Functional effectiveness of threat appeals in exercise promotion messages. *Psicologica, 31,* 577–604.

Brett, A. S., Phillips, M., & Beary, J. F. III. (1986, March 8). Predictive power of the polygraph: Can the "lie detector" really detect liars? *Lancet, 1*(8480), 544–547.

Brewer, C. L. (1991). Perspectives on John B. Watson. In G. A. Kimble, M. Wertheimer, & C. L. White (Eds.), *Portraits of pioneers in psychology* (pp. 170–186). Washington, DC: American Psychological Association.

Brewer, M. B., Dull, V., & Lui, L. (1981). Perceptions of the elderly: Stereotypes and prototypes. *Journal of Personality and Social Psychology, 41,* 656–670.

Bridge, J. A., Satish, I., Salary, C. B., Barbe, R. P., Birmaher, B., Pincus, H. A., . . . Brent, D. A. (2007, April 18). Clinical response and risk for reported suicidal ideation and suicide attempts in pediatric antidepressant treatment: A meta-analysis of randomized controlled trials. *JAMA: Journal of the American Medical Association, 297,* 1683–1696.

Brislin, R. (1974). The Ponzo illusion: Additional cues, age, orientation, and culture. *Journal of Cross-Cultural Psychology, 5,* 139–161.

Brislin, R. (1993). *Understanding culture's influence on behavior.* Fort Worth, TX: Harcourt Brace Jovan ovich.

Brislin, R. W. (1981). *Cross-cultural encounters: Face-to-face interaction.* New York, NY: Pergamon.

Broadwell, S. D., & Light, K. C. (1999). Family support and cardiovascular responses in married couples during conflict and other interactions. *International Journal of Behavioral Medicine, 6,* 40–63.

Bronfenbrenner, U., & Ceci, S. J. (1994). Nature–nurture reconceptualized in developmental perspective: A bioecological model. *Psychological Review, 101,* 568–586.

Bronheim, S. (2000, January/February). The impact of the Human Genome Project on the science and practice of psychology. *Psychological Science Agenda, 13*(1), 12.

Brookhart, S. (2001). Persuasion and the "poison parasite." *APS Observer, 14*(8), 7.

Brown, A. M. (1990). *Human universals*. Unpublished manuscript, University of California, Santa Barbara.

Brown, C. (2003, October). The stubborn scientist who unraveled a mystery of the night. *Smithsonian,* 92–99.

Brown, J. D. (1991). Accuracy and bias in self- knowledge. In C. R. Snyder & D. F. Forsyth (Eds.), *Handbook of social and clinical psychology: The health perspective.* New York, NY: Pergamon.

Brown, J. L., & Pollitt, E. (1996, February). Malnutrition, poverty and intellectual development. *Scientific American, 274*(2), 38–43.

Brown, K. (2003a, March 14). The medication merry-go-round. *Science, 299,* 1646–1649.

Brown, K. (2003b, July 11). New attention to ADHD genes. *Science, 301,* 160–161.

Brown, R., & Kulik, J. (1977). Flashbulb memories. *Cognition, 5,* 73–99.

Brown, R., & McNeill, D. (1966). The "tip of the tongue" phenomenon. *Journal of Verbal Learning and Verbal Behavior, 5,* 325–337.

Brown, S. L., Nesse, R. M., Vinokur, A. D., & Smith, D. M. (2003). Providing social support may be more beneficial than receiving it: Results from a prospective study of mortality. *Psychological Science, 14,* 320–327.

Brown, W. A. (1998, January). The placebo effect. *Scientific American, 278*(1), 90–95.

Bruck, M., & Ceci, S. (2004). Forensic developmental psychology: Unveiling four common misconceptions. *Current Directions in Psychological Science, 13,* 229–232. [See also: Loftus, 2004; Neimark, 2004.]

Bruin, J. E., Kellenberger, L. D., Gerstein, H. C., Morrison, K. M., & Holloway, A C. (2007). Fetal and neonatal nicotine exposure and postnatal glucose homeostasis: Identifying critical windows of exposure. *Journal of Endocrinology, 194,* 171–178.

Bruner, J. S., Olver, R. R., & Greenfield, P. M. (1966). *Studies in cognitive growth.* New York, NY: Wiley.

Brunet, A., Orr, S. P., Tremblay, J., Robertson, K., Nader, K., & Pitman, R. K. (2007). Effect of post-retrieval propranolol on

psychophysiologic responding during subsequent script-driven traumatic imagery in post-traumatic stress disorder. *Journal of Psychiatric Research, 42,* 503–506.

Brunner, H. G., Nelen, M., Breakefield, X. O., Ropers, H. H., & van Oost, B. A. (1993). Abnormal behavior associated with a point mutation in the structural gene for monoamine oxidase A. *Science, 262,* 578.

Bryck, R. L., & Fisher, P. A. (2012). Training the brain: Practical applications of neural plasticity from the intersection of cognitive neuroscience, developmental psychology, and prevention science. *American Psychologist, 67*(2), 87–100. doi: 10.1037/a0024657

Buchel, C., Coull, J. T., & Friston, K. J. (1999). The predictive value of changes in effective connectivity for human learning. *Science, 283,* 1538–1541. [See also: Bower, 1999.]

Buckner, R., Andrews-Hanna, J., & Schacter, D. (2008). The brain's default network: Anatomy, function and relevance to disease. *Annals of the New York Academy of Sciences, 1124,* 1–38.

Buhrmester, D. (1996). Need fulfillment, interpersonal competence, and the developmental contexts of early adolescent friendship. In W. M. Bukowski, A. F. Newcomb, & W. W. Hartup (Eds.), *The company they keep: Friend In C. Murchison (Ed ship during childhood and adolescence* (pp. 158–185). New York, NY: Cambridge University Press.

Bullock, T. H., Bennett, M. V. L., Johnston, D., Josephson, R., Marder, E., & Fields, R. D. (2005, November 4). The neuron doctrine, redux. *Science, 310,* 791–793.

Bureau of Justice Statistics, (2009). *Corrections statistics.* Retrieved from www.ojp.usdoj.gov/bjs/correct.htm.

Burger, J. M. (2009, January). Replication Milgram: Would people still obey today? *American Psychologist, 64,* 1–10.

Bushman, B. J., & Anderson, C. A. (2001). Media violence and the American public: Scientific facts versus media misinformation. *American Psychologist, 56,* 477–489.

Buss, D. M. (1999). *Evolutionary psychology: The new science of the mind.* Boston, MA: Allyn & Bacon.

Buss, D. M. (2008). *Evolutionary psychology: The new science of the mind* (3rd ed.). Boston, MA: Allyn & Bacon. [See also: Archer, 1996; Buss & Schmitt, 1993.]

Buss, D. M., Haselton, M. G., Shackelford, T. K., Bleske, A. L., & Wakefield, J. C. (1998). Adaptations, exaptations, and spandrels. *American Psychologist, 53,* 533–548.

Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100,* 204–232.

Bussey, K., & Bandura, A. (1999). Social cognitive theory of gender development and differentiation. *Psychological Review, 106*(4), 676.

Butcher, J. N., Mineka, S., & Hooley, J. M. (2008). *Abnormal psychology: Core concepts.* Boston, MA: Allyn & Bacon.

Butcher, J. N., & Williams, C. L. (1992). *Essentials of MMPI-2 and MMPI-A interpretation.* Minneapolis: University of Minnesota Press.

Butcher, J. N., Mineka, S., & Hooley, J. M. (2010). *Abnormal Psychology* (14th ed.). Boston, MA: Pearson.

Butler, A. C., Chapman, J. E., Forman, E. M. & Beck, A. T. (2006). The empirical status of cognitive-behavioral therapy: A review of meta-analyses. *Clinical Psychology Review, 26,* 17–31.

Button, T. M. M., Thapar, A., & McGuffin, P. (2005). Relationship between antisocial behavior, attention-deficit hyperactivity disorder, and maternal prenatal smoking. *British Journal of Psychiatry, 187,* 155–160.

Buzsáki, G. (2006). *Rhythms of the brain.* Oxford, England: Oxford University Press.

Byne, W. (1995). The biological evidence challenged. *Scientific American, 270*(5), 50–55.

Byrne, D. (1969). Attitudes and attraction. In L. Berkowitz (Ed.), *Advances in experimental social psychology (Vol. 4).* New York, NY: Academic Press.

Cabeza, R. (2002). Hemispheric asymmetry reduction in older adults: The HAROLD model. *Psychology & Aging, 17*(1), 85–100.

Caci, B., Cardaci, M., Tabacchi, M. E., & Scrima, F. (2014). The big five personality factors as predictors of Facebook usage. *Psychological Reports, 114*(2), 1–12.

Cacioppo, J. T., & Brentson, G. G. (2005). *Essays in neuroscience.* Cambridge, MA: MIT Press.

Caldwell, M. (1995, June). Kernel of fear. *Discover, 16,* 96–102.

Caldwell, M. R., McCormick, D. J., Umstead, D., & VanRybroek, G. J. (2007). Evidence of treatment progress and therapeutic outcomes among adolescents with psychopathic features. *Criminal Justice and Behavior, 34,* 573–587.

Calev, A., Nigal, D., Shapira, B., Tubi, N., Chazan, S., Ben-Yehuda, Y., . . . Lerer, B. (1991). Early and long-term effects of electroconvulsive therapy and depression on memory and other cognitive functions. *Journal of Nervous and Mental Disorders, 179,* 526–533.

Calkins, M. W. (1906). A reconciliation between structural and functional psychology. *Psychological Review, 13,* 61–81. Archived at the Classics in the History of Psychology site: http://psychclassics.yorku.ca/Calkins/reconciliation.htm.

Calkins, M. W. (1930). Autobiography of Mary Whiton Calkins. In C. Murchison (Ed.), *History of psychology in autobiography* (Vol. 1, pp. 31–61). Archived at the Classics in the History of Psychology site: http://psychclassics.yorku.ca/Calkins/murchison.htm

Calkins, M. W. (2007, May 31). In Biographical Dictionary—s9.com. Retrieved from http://www.s9.com/Biography/Calkins-Mary-Whiton

Callaghan, E., Rochat, P., Lillard, A., Clau, M. L., Odden, H., Itakura, S., . . . Singh, S. (2005). Synchrony in the onset of mental-state reasoning: Evidence from five futures. *Psychological Science, 16,* 378–384.

Callahan, J. (1997, May/June). Hypnosis: Trick or treatment? *Health, 11*(1), 52–55. [See also: Miller & Bowers, 1993; Orne, 1980]

Calvert, J. D. (1988). Physical attractiveness: A review and reevaluation of its role in social skill research. *Behavioral Assessment, 10,* 29–42.

Cann, A., Calhoun, L. G., Selby, J. W., & Kin, H. E. (Eds.). (1981). Rape. *Journal of Social Issues, 37* (Whole No. 4).

Cannon, W. B. (1914). The interrelations of emotions as suggested by recent physiological researchers. *American Journal of Psychology, 25,* 256.

Caplow, T. (1982). *Middletown families: Fifty years of change and continuity.* Minneapolis: University of Minnesota Press.

Caporeal, L. R. (1976). Ergotism: The Satan loosed in Salem? *Science, 192,* 21–26.

Capps, J. G., & Ryan, R. (2005). It's not just poly-graph anymore. *APA Online: Psychological Science Agenda.* Retrieved from www.apa.org/science/psa/polygraph_prnt.html.

Caprara, G. V., & Alessandri, G. (2014). Optimal functioning: a review of current explorations of positive orientation. In S. Cooper and & K. Ratele ( Eds.), *Psychology serving humanity* (pp. 202–214). London, England: Psychology Press.

Caprara, G. V., Alessandri, G., Trommsdorff, G., Heikamp, T., Yamaguchi, S., & Suzuki, F. (2012). Positive orientation across countries. *Journal of Cross Cultural Psychology, 43,* 77–83.

Caprara, G. V., & Cervone, D. (2000). *Personality: Determinants, dynamics, and potentials*. New York, NY: Cambridge University Press.

Carducci, B. J., & Zimbardo, P. G. (1995). Are you shy? *Psychology Today, 28,* 34 ff.

Carek, P. J., Laibstain, S. E., & Carek, S. M. (2011). Exercise for the treatment of depression and anxiety. *International Journal of Psychiatry in Medicine, 41,* 15–28.

Carlat, D. (2010, March 30). Psychologists and prescription privileges: A conversation (part one). *The New Psychiatry.* Retrieved from www.psychologytoday.com/blog/the-new-psychiatry/201003/psychologists-and-prescription-privileges-conversation-part-one.

Carlo, G., Mestre, M. V., Samper, P., Tur, A., & Armenta, B. E. (2011). The longitudinal relations among dimensions of parenting styles, sympathy, prosocial moral reasoning, and prosocial behaviors. *International Journal of Behavioral Development*, *35*(2), 116–124.

Carlsmith, K. M. (2006). The roles of retribution and utility in determining punishment. *Journal of Experimental Social Psychology, 42,* 437–451.

Carlson, L. E., Speca, M., Faris, P., & Patel, K. D. (2007). One year pre-post intervention follow-up of psychological, immune, endocrine and blood pressure outcomes of mindfulness-based stress reduction (MBSR) in breast and prostate cancer outpatients. *Brain, Behavior, and Immunity, 21,* 1038–1049.

Carlson, N. R. (2007). *Physiology of behavior* (9th ed.). Boston, MA: Allyn & Bacon.

Carnagey, N. L., Anderson, C. A., & Bushman, B. J. (2007). The effect of video game violence on physiological desensitization to real-life violence. *Journal of Experimental Social Psychology, 43,* 489–496.

Carpenter, G. C. (1973). Differential response to mother and stranger within the first month of life. *Bulletin of the British Psychological Society, 16,* 138.

Carpenter, S. (1999, August 14). A new look at recognizing what people see. *Science News, 156,* 102.

Carpenter, S. (2000, September). Stoicism reconsidered. *Monitor on Psychology, 31*(8), 58–61.

Carskadon, M. A. (Ed.). (2002). *Adolescent sleep patterns: Biological, social, and psychological influences*. Cambridge, MA: Cambridge University Press.

Carson, R. C., Butcher, J. N., & Mineka, S. (2000). *Abnormal psychology and modern life* (11th ed.). Boston, MA: Allyn & Bacon.

Carson, S. (2011, May/June) The unleashed mind: Why creative people are eccentric: Highly creative people often seem weirder than the rest of us. Now researchers know why. *Scientific American Mind, 22,* 22–29. doi:10.1038/scientificamericanmind0511-22

Carstensen, L. (2011). *A bright future: Happiness, health, and financial security in an age of increased longevity.* New York, NY: Broadway Books.

Carstensen, L. L. (1987). Age-related changes in social activity. In L. L. Carstensen & B. A. Edelstein (Eds.), *Handbook of clinical gerontology* (pp. 222–237). New York, NY: Pergamon Press.

Carstensen, L. L. (1991). Selectivity theory: Social activity in life-span context. In K. W. Schaie (Ed.), *Annual review of geriatrics and gerontology* (Vol. 11). New York, NY: Springer.

Carstensen, L. L., & Freund, A. M. (1994). Commentary: The resilience of the aging self. *Developmental Review, 14,* 81–92.

Cartwright, R. D. (1977). *Night life: Explorations in dreaming.* Englewood Cliffs, NJ: Prentice Hall.

Cartwright, R. D. (1984). Broken dreams: A study of the effects of divorce and depression on dream content. *Psychiatry, 47,* 251–259.

Carver, C. S., & Scheier, M. F. (2008). *Perspectives on personality* (6th ed.). Boston, MA: Allyn & Bacon. [See also: Digman, 1990; Goldberg, 1981, 1993.]

Carver, P., Egan, S., & Perry, D. (2004). Children who question their heterosexuality. *Developmental Psychology, 40,* 43–53.

Casey, B. J., Jones, R. M., & Hare, T. A. (2008). The adolescent brain. *Annals of the New York Academy of Science, 1124,* 111–126.

Casey, B. J., Somerville, L. H., Gotlib, I. H., Ayduk, O., Franklin, N. T., Askren, M. K., . . . Shoda, Y. (2011). Behavioral and neural correlates of delay of gratification 40 years later. *Proceedings of the National Academy of Sciences, 108*(10), 14998–15003. doi:10.1073/pnas.1108561108

Casey, J. F., & Wilson, L. (1991). *The flock.* New York, NY: Fawcett Columbine.

Cash, T. F., & Janda, L. H. (1984, December). The eye of the beholder. *Psychology Today, 18,* 46–52.

Cassidy, J., & Shaver, P. R. (Eds.). (2008). *Handbook of attachment: Theory, research, and clinical applications* (2nd ed.). New York, NY: Guilford Press.

Cassileth, B. R., Lusk, E. J., Strouse, T. B., Miller, D. S., Brown, L. L. and Cross, P. A. (1985), A psychological analysis of cancer patients and their next-of-kin. *Cancer, 55*: 72–76.

Catarino, A., Kupper, C. S., Werner-Seidler, A., Dalgleish, T., & Anderson, M. C. (2015). Failing to forget: Inhibitory-control deficits compromise memory suppression in posttraumatic stress disorder. *Psychological Science, 26*(5), 604–616.

Cattell, R. B. (1963). Theory of fluid and crystallized intelligence: A critical experiment. *Journal of Educational Psychology, 54,* 1–22.

Cawley, J., & Meyerhoefer, C. (2011). The medical care costs of obesity: An instrumental variables approach. *Journal of Health Economics, 31,* 219–230.

Cawley, J., Rizzo, J. A., & Haas, K. (2007). Occupation-specific absenteeism costs associated with obesity and morbid obesity. *Journal of Occupational and Environmental Medicine, 49,* 1317–1324*.*

Cawthon, R. M., Smith, K. R., O'Brien, E., Sivatchenko, A., Kerber, R. A. (2003). Association between telomere length in blood and mortality in people aged 60 years or older. *Lancet, 361*, 393–395.

Ceci, S. J., & Williams, W. M. (1997). Schooling, intelligence, and income. *American Psychologist, 52,* 1051–1058.

Centers for Disease Control and Prevention. (2007). *Smoking and tobacco use.* Retrieved from www.cdc.gov/tobacco/data_statistics/Factsheets/adult_cig_smoking.htm.

Centers for Disease Control and Prevention. (2011). Million hearts: Strategies to reduce the prevalence of leading cardiovascular disease risk factors—United States, 2011. *Morbidity and Mortality Weekly Report, 60,* 1248–1251.

Centers for Disease Control and Prevention. (2015a, April 16). *E-cigarette use triples among middle and high school students in just one year.* Retrieved from http://www.cdc.gov/media/releases/2015/p0416-e-cigarette-use.html

Centers for Disease Control and Prevention. (2015b). Vaccines do not cause autism. Retrieved from http://www.cdc.gov/vaccinesafety/concerns/autism/

Centers for Disease Control and Prevention's National Center on Birth Defects and Developmental Disabilities. (2015). *Fetal alcohol spectrum disorders.* Retrieved from www.cdc.gov/fasd

Centre for Addiction and Mental Health. (2015, January 28). *New biological evidence reveals link between brain inflammation and major depression.* Retrieved from http://www.camh.ca/en/hospital/about_camh/newsroom/news_releases_media_advisories_and_backgrounders/current_year/Pages/New-biological-evidence-reveals-link-between-brain-inflammation-and-major-depression.aspx

Cernak, I. (2015). Blast injuries and blast-induced neurotrauma: Overview of Pathophysiology and experimental knowledge—models and findings. In F. Kobeissy (Ed.), *Brain Neurotrauma* (pp. 631–644). Boca Raton, FL: CRC Press. doi: 10.1201/b18126-53

Cervone, D. (2004). The architecture of personality. *Psychological Review, 111,* 183–204.

Cervone, D., & Shoda, Y. (1999). Beyond traits in the study of personality coherence. *Current Directions in Psychological Science, 8,* 27–32.

Chalmers, D. J. (1995, December). The puzzle of conscious experience. *Scientific American, 273*(6), 80–86. [See also: Churchland, 1995; Crick, 1994]

Chamberlain, K., & Zika, S. (1990). The minor events approach to stress: Support for the use of daily hassles. *British Journal of Psychology, 81,* 469–481.

Chamberlin, J. (2004, July/August). Survey says: More Americans are seeking mental health treatment. *Monitor on Psychology, 35*(7), 17.

Chamberlin, J. (2008, December). The sleep aide: Jack Edinger helps patients remove the barriers to a good night's sleep. *Monitor on Psychology, 39*(11), 40–43.

Chamberlin, J. (2011, December). Willpower pioneer wins $100,000 Grawemeyer prize. *Monitor on Psychology*, *42*(11), p. 10. Retrieved from http://www.apa.org/monitor/2011/12/grawemeyer.aspx

Chambless, D. L., Sanderson, W. C., Shoham, V., Johnson, S. B., Pope, K. S., Crits-Christoph, P., . . . McCurry, S. (1996). An update on empirically validated therapies. *Clinical Psychologist, 49,* 5–18.

Chan, L., Chiu, P. Y., & Lau, T. K. (2003). An in-vitro study of ginsenoside Rb1–induced teratogenicity using a whole rat embryo culture model. *Human Reproduction, 18,* 2166–2168.

Chapman, D. (2012, October 22). Leader of the quack attack. *Midweek.com.* Retrieved from http://www.midweek.com/home/marcus-mariota/

Chapman, P. D. (1988). *Schools as sorters: Lewis M. Terman, applied psychology, and the intelligence testing movement, 1890–1930.* New York, NY: New York University Press.

Chapman, S. B., Aslan, S., Spence, J. S., Hart, J. J., Bartz, E. K., Didehbani, N., . . . Lu, H. (2015). Neural mechanisms of brain plasticity with complex cognitive training in healthy seniors. *Cerebral Cortex, 25*(2), 396–405. doi:10.1093/cercor/bht234

Charles, S. T., & Carstensen, L. L. (2010). Social and emotional aging. *Annual Review of Psychology, 61,* 383–409.

Chartrand, T. L., & Bargh, J. A. (1999). The chameleon effect: The perception–behavior link and social interaction. *Journal of Personality & Social Psychology, 76,* 893–910.

Chaudhari, N., Landin, A. M., & Roper, S. D. (2000). A metabotropic glutamate receptor variant functions as a taste receptor. *Nature Neuroscience, 3,* 113–119.

Chen, B. (2014, December 13). Marcus Mariota top contender for Heisman. *Samoa News*.

Chen, C-Y., Lin, Y-H., & Hsiao, C-L. (2012). Celebrity endorsement for sporting events using classical conditioning. *International Journal of Sports Marketing & Sponsorship, 13*(3), 209–219.

Chen, E., Fisher, E. B., Bacharier, L. B., & Strunk, R. C. (2003). Socioeconomic status, stress, and immune markers in adolescents with asthma. *Psychosomatic Medicine, 65,* 984–992.

Chen, I. (2012, January/February). A feeling for the past. *Scientific American Mind, 22,* 24–31.

Cherney, E. D., & London, K. (2006). Gender-linked differences in the toys, television shows, computer games, and outdoor activities of 5- to 13-year-old children. *Sex Roles, 54,* 717–726.

Chiaccia, K. B. (2007). Insanity defense. *Encyclopedia of Psychology.* Retrieved from http://findarticles.com/p/articles/mi_g2699/is_0005/ai_2699000509. [See also: Consensus Project (n. d.)]

Chisuwa, N., & O'Day, J. A. (2010). Body image and eating disorders amongst Japanese adolescents: A review of the literature. *Appetite, 54*(1), 5–15.

Chivers, M., Seto, M. C., & Blanchard, R. (2007). Gender and sexual orientation differences in sexual response to sexual activities versus gender of actors in sexual films. *Journal of Personality and Social Psychology, 93,* 1108–1121.

Chklovskii, D. B., Mel, B. W., & Svoboda, K. (2004, October 14). Cortical re-wiring and information storage. *Nature 431,* 782–788.

Chodzko-Zajko, W., Kramer, A. F., & Poon, L. W. (2009). *Enhancing cognitive functioning and brain plasticity.* Champaign, IL: Human Kinetics.

Chomsky, N. (1965). *Aspects of a theory of syntax.* Cambridge, MA: MIT Press.

Chomsky, N. A. (1977). On Wh-movement. In P. W. Culicover, T. Wasw, & A. Akmajian (Eds.), *Formal syntax*. San Francisco, London, England: Academic Press.

Chorney, M. J., Chorney, N. S., Owen, M. J., Daniels, J., McGuffin, P., Thompson, L. A., . . . Plomin, R. (1998). A quantitative trait locus associated with cognitive ability in children. *Psychological Science, 9,* 159–166.

Christenfeld, N., Gerin, W., Linden, W., Sanders, M., Mathus, J., Deich, J. D., et al. (1997). Social support effects on cardiovascular reactivity: Is a stranger as effective as a friend? *Psychosomatic Medicine, 59,* 388–398.

Christensen, A., & Jacobson, N. S. (1994). Who (or what) can do psychotherapy: The status and challenge of nonprofessional therapies. *Psychological Science, 5,* 8–14.

Chua, H. F., Boland, J. E., & Nisbett, R. E. (2005, August 30). Cultural variation in eye movements during scene perception. *Proceedings of the National Academy of Sciences, 102,* 12629–12633.

Church, A. T., Katigbak, M. S., Del Prado, A. M., Ortiz, F. A., Mastor, K. A., Harumi, Y., . . . Cabrera, H. F. (2006). Implicit theories and self-perceptions of traitedness across cultures: Toward integration of cultural and trait psychology perspectives. *Journal of Cross-Cultural Psychology, 37,* 694–716.

Church, A. T., Katigbak, M. S., Ortiz, F. A., Del Prado, A. M., De Jesús Vargas-Flores, J., Ibáñez-Reyes, J., . . . Cabrera, H. F. (2005). Investigating implicit trait theories across cultures. *Journal of Cross-Cultural Psychology, 36,* 476–496.

Cialdini, R. B. (2001). *Influence: Science and practice* (4th ed.). Boston, MA: Allyn & Bacon.

Cialdini, R. B. (2007). *Influence: The psychology of persuasion.* New York, NY: HarperCollins.

Clark, L. A. (2009). Stability and change in personality disorder. *Current Directions in Psychological Science, 18,* 27–31.

Clark, M. S., Mills, J. R., & Corcoran, D. M. (1989). Keeping track of needs and inputs of friends and strangers. *Personality and Social Psychology Bulletin, 15,* 533–542.

Clark, R. E., & Squire, L. R. (1998, April 3). Classical conditioning and brain systems: The role of awareness. *Science, 280,* 77–81.

Clay, R. A. (2000, January). Psychotherapy is cost-effective. *Monitor on Psychology, 31*(1), 40–41.

Clay, R. A. (2003a, April). An empty nest can promote freedom, improved relationships. *Monitor on Psychology, 33,* 40–41.

Clay, R. A. (2003b, April). Researchers replace midlife myths with facts. *Monitor on Psychology, 34,* 38–39.

Clay, R. A. (2009a, September). Prevention works. *Monitor on Psychology, 40*(8), 42–44.

Clay, R. A. (2009b). Postgrad growth area: Forensic psychology. *GradPsych,* (7). Retrieved from www.apa.org/gradpsych/2009/11/postgrad.aspx.

Clay, R. A. (2012, January). Beyond psychotherapy. *Monitor on Psychology, 43*(1), 46–49. Retrieved from http://www.apa.org/monitor/2012/01/psychotherapy.aspx

Cleek, M. B., & Pearson, T. A. (1985). Perceived causes of divorce: An analysis of interrelationships. *Journal of Marriage and the Family, 47,* 179–191.

Clifton, S., & Myers, K. K. (2005). The socialization of emotion: Learning emotion management at the fire station. *Journal of Applied Communication Research, 33,* 67–92.

Coan, J. A., Schaefer, H., & Davidson, R. J. (2006). Lending a hand: Social regulation of the neural responses to threat. *Psychological Science, 17,* 1032–1039.

Coghill, R. C., McHaffie, J. G., & Yen, Y. (2003, July 8). Neural correlates of interindividual differences in the subjective experience of pain. *Proceedings of the National Academy of Sciences, 14,* 8538–8542.

Cohen, D., & Gunz, A. (2002). As seen by the other . . .: Perspectives on the self in the memories and emotional perceptions of Easterners and Westerners. *Psychological Science,* 55–59. [See also: Gardiner et al., 1998; Markus & Kitayama, 1994.]

Cohen, G. L., Garcia, J., Apfel, N., & Master, A. (2006). Reducing the racial achievement gap: A social-psychological intervention. *Science, 313,* 1307–1310.

Cohen, G. L., Garcia, J., Purdie-Vaugns, V., Apfel, N., & Brzustoski, P. (2009). Recursive processes in self-affirmation: Intervening to close the minority achievement gap. *Science, 324,* 400–403.

Cohen, J. (2002, February 8). The confusing mix of hype and hope. *Science, 295,* 1026.

Cohen, J. D., & Tong, F. (2001, 28 September). The face of controversy. *Science, 293,* 2405–2407.

Cohen, M. N. (1998). *Culture of intolerance: Chauvinism, class, and racism in the United States.* New Haven, CT: Yale University Press.

Cohen, R. E., & Ahearn, F. L., Jr. (1980). *Handbook for mental health care of disaster victims.* Baltimore: Johns Hopkins University Press.

Cohen, S., Doyle, W. J., Turner, R. B., Alper, C. M., & Skoner, D. P. (2003). Emotional style and susceptibility to the common cold. *Psychosomatic Medicine, 63,* 652–657.

Cohen, S., & Girgus, J. S. (1973). Visual spatial illusions: Many explanations. *Science, 179,* 503–504.

Cohen, S., & Syme, S. L. (Eds.). (1985). *Social support and health.* Orlando, FL: Academic Press.

Cohn, D., Livingston, G., & Wang, W. (2014, April). *After decades of decline, a rise in stay-at-home mothers.* Washington, D.C.: Pew Research Center's Social & Demographic Trends Project.

Colby, A., Kohlberg, L., Gibbs, J., & Lieberman, M. (1983). A longitudinal study of moral judgment. *Monographs of the Society for Research in Child Development, 481*(1–2, Serial No. 200).

Colcombe, S. J., Kramer, A. F., Erickson, K. I., Scalf, P., McAuley, E., Cohen, N. J., . . . Elavsky, S. (2004). Cardiovascular fitness, cortical plasticity, and aging. *Proceedings of the National Academy of Sciences, 101,* 3316–3321.

Cole, M. (2006). Internationalism in psychology: We need it now more than ever. *American Psychologist, 61,* 904–917. [See also Fowers & Richardson, 1996; Gergen et al., 1996; Segall et al., 1998; Triandis, 1994, 1995]

Collinger, J. L., Wodlinger, B., Downey, J. E., Wang, W., Tyler-Kabara, E. C., Weber, D. J., . . . Schwartz, A. B. (2013). High-performance neuroprosthetic control by an individual with tetraplegia. *Lancet 381*(9866), 557–564.

Collins, A. W., Maccoby, E. E., Steinberg, L., Hetherington, E. M., & Bornstein, M. H. (2000). Contemporary research on parenting: The case for nature and nurture. *American Psychologist, 55,* 218–232.

Collins, G. P. (2001, October). Magnetic revelations: Functional MRI highlights neurons receiving signals. *Scientific American, 285*(4), 21.

Collins, N. L., & Read, S. J. (1990). Adult attachment, working models, and relationship quality in dating couples. *Journal of Personality and Social Psychology, 58,* 644–663.

Collins, S., & Long, A. (2003). Too tired to care? The psychological effects of working with trauma. *Journal of Psychiatric and Mental Health Nursing, 10,* 17–27.

Colom, R., Flores-Mendoza, C. E., & Abad, F. J. (2007). Generational changes on the draw-a-man test: A comparison of Brazilian urban and rural children tested in 1930, 2002 and 2004. *Journal of Biosocial Science, 39,* 79–89.

Coloroso, B. (2008). *The Bully, the bullied, and the bystander: From preschool to high school: How parents and teachers can break the cycle of violence.* New York, NY: HarperCollins.

Committee on Substance Abuse and Committee on Children with Disabilities. (2000). Fetal alcohol syndrome and alcohol-related neurodevelopmental disorders. *Pediatrics, 106,* 358–361.

Conklin, H. M., & Iacono, W. G. (2004). Schizophrenia: A neurodevelopmental perspective. In T. F. Oltmans & R. E. Emery (Eds.), *Current Directions in Abnormal Psychology* (pp. 122–129). Upper Saddle River, NJ: Prentice Hall.

Conley, C. (2007). *Peak: How great companies get their Mojo from Maslow.* San Francisco, CA: Jossey-Bass.

Conner, D. B., & Cross, D. R. (2003). Longitudinal analysis of the presence, efficacy, and stability of maternal scaffolding during informal problem- solving interactions. *British Journal of Developmental Psychology, 21,* 315–334.

Conrad, R. (1964). Acoustic confusions in immediate memory. *British Journal of Psychology, 55,* 75–84.

*Consumer Reports.* (1995, November). Mental health: Does therapy help? 734–739.

Contrada, R. J., Ashmore, R. D., Gary, M. L., Coups, E., Egeth, J. D., Sewell, A., . . . Chasse, V. (2000). Ethnicity-related sources of stress and their effects on well-being. *Current Directions in Psychological Science, 9,* 136–139.

Cook, M., Mineka, S., Wolkenstein, B., & Laitsch, K. (1985). Observational conditioning of snake fear in unrelated rhesus monkeys. *Journal of Abnormal Psychology, 94,* 591–610.

Cooper, R., Cutler, J., Desvignes-Nickens, P., Fortmann, S.P., Friedman, L., Havlik, R., . . . Thom, T. (2000). Trends and disparities in coronary heart disease, stroke, and other cardiovascular diseases in the United States. *Circulation, 102,* 3137–3147.

Cooper, R. S. (2005). Race and IQ: Molecular genetics as deus ex machina. *American Psychologist, 60,* 71–76.

Corkin, S. (2002). What's new with the amnesic patient H. M.? *Nature Reviews Neuroscience, 3,* 153–160. Retrieved from http://homepage.mac.com/sanagnos/corkin2002.pdf.

Correll, J., Park, B., Judd, C. M., Wittenbrink, B., Sadler, M. S., & Keesee, T. (2007). Across the thin blue line: police officers and racial bias in the decision to shoot. *Journal of Personality and Social Psychology, 92*(6), 1006–1023.

Costa, P. T., Jr., & McCrae, R. R. (1992a). Four ways five factors are basic. *Personality and Individual Differences, 13,* 653–665.

Costa, P. T., Jr., & McCrae, R. R. (1992b). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual.* Odessa, FL: Psychological Assessment Resources.

Coughlin, E. K. (1994, October 26). Class, IQ, and heredity. *The Chronicle of Higher Education,* A12, A20.

Courchesne, E., Chisum, H., & Townsend, J. (1994). Neural activity-dependent brain cells in development: Implications for psychopathology. *Development and Psychopathology, 6,* 697–722.

Couzin, J. (2005, May 6). A heavyweight battle over CDC's obesity forecasts. *Science, 308,* 770–771.

Couzin, J. (2006, October 27). Unraveling pain's DNA. *Science, 314,* 585–586.

Covington, M. V. (2000). Intrinsic versus extrinsic motivation in schools: A reconciliation. *Current Direction in Psychology Science, 9,* 22–25.

Cowan, N. (2010). The magical mystery four: How is working memory capacity limited, and why? *Current Directions in Psychological Science*, *19*(1), 51–57. doi:10.1177/0963721409359277

Cowan, P., & Cowan, P. A. (1988). Changes in marriage during the transition to parenthood. In G. Y. Michaels & W. A. Goldberg (Eds.), *The transition to parenthood: Current theory and research.* Cambridge, England: Cambridge University Press.

Coyne, J. C., Burchill, S. A. L., & Stiles, W. B. (1991). An interactional perspective on depression. In C. R. Snyder & D. O. Forsyth (Eds.), *Handbook of social and clinical psychology: The health perspective* (pp. 327–349). New York, NY: Pergamon Press.

Coyne, J. C., Pajak, T. F., Harris, J., Konski, A., Moysas, B., Ang, K., . . . Radiation Therapy Oncology Group (2007). Emotional well-being does not predict survival in head and neck cancer patients: A Radiation Therapy Oncology Group study. *Cancer, 110*(11), 2568–2575.

Coyne, K. J. C. (2001, February). Depression in primary care: Depressing news, exciting research opportunities. *APS Observer, 14*(2), 1, 18.

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11,* 671–684.

Craik, F. I. M., & Tulving, E. (1975). Depth of processing and the retention of words in episodic memory. *Journal of Experimental Psychology: General, 104,* 268–294.

Cramer, P. (2000). Defense mechanisms in psychology today. *American Psychologist, 55,* 637–646.

Crandall, C. S., Preisler, J. J., & Aussprung, J. (1992). Measuring life event stress in the lives of college students: The Undergraduate Stress Questionnaire (USQ). *Journal of Behavioral Medicine, 15*(6), 627–662.

Cree, G. S., & McRae, K. (2003). Analyzing the factors underlying the structure and computation of the meaning of chipmunk, cherry, cheese, and cello (and many other such concrete nouns). *Journal of Experimental Psychology: General, 132,* 163–201. [See also: Posner & McCandliss, 1993; Raichle, 1994; Solso, 2001.]

Crick, F., & Mitchison, G. (1983). The function of dream sleep. *Nature, 304,* 111–114.

Crocker, J., & Major, B. (1989). Social stigma and self-esteem: The self-protective properties of stigma. *Psychological Review, 96,* 608–630.

Crohan, S. E., Antonucci, T. C., Adelmann, P. K., & Coleman, L. M. (1989). Job characteristics and well-being at mid-life. *Psychology of Women Quarterly, 13,* 223–235.

Cromwell, R. L. (1993). Searching for the origins of schizophrenia. *Psychological Science, 4,* 276–279.

Crossley, N. A., Mechelli, A., Scott, J., Carletti, F., Fox, P.T., McGuire, P., & Bullmore, E. T. (2014). The hubs of the human connectome are generally implicated in the anatomy of brain disorders. *Brain, 137*(Pt 8), 2382-95. doi: 10.1093/brain/awu132

Crovitz, H. F., & Daniel, W. F. (1984). Measurements of everyday memory: Toward the prevention of forgetting. *Bulletin of Psychonomic Society, 22,*413–414.

Crowder, R. G. (1992). Eidetic images. In L. R. Squire (Ed.), *The encyclopedia of learning and memory* (pp. 154–156). New York, NY: Macmillan.

Crowell, T. A. (2002). Neuropsychological findings in combat-related posttraumatic stress disorder. *Clinical Neuropsychologist, 16,* 310–321.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience.* New York, NY: Harper & Row.

Csikszentmihalyi, M. (1996, July/August). The creative personality. *Psychology Today, 29*(4), 34–40.

Csikszentmihalyi, M. (1998). *Finding flow.* New York, NY: Basic Books.

Csikszentmihalyi, M., Larson, R., & Prescott, S. (1977). The ecology of adolescent activity and experience. *Journal of Youth and Adolescence, 6,* 281–294.

Csikszentmihalyi, M., Rathunde, K. R., Whalen, S., & Wong, M. (1993). *Talented teenagers: The roots of success and failure.* New York, NY: Cambridge University Press.

Cuthbert, B. N., & Insel, T. R. (2013). Toward the future of psychiatric diagnosis: The seven pillars of RDoC. *BMC Medicine, 11,* 126. doi: 10.1186/1741-7015-11-126

Cynkar, A. (2007a, April). Low glucose levels compromise self-control. *Monitor on Psychology, 38*(4), 13.

Cynkar, A. (2007b, May). Demand a seat: Speak up about evidence-based practice to ensure public access to quality mental health care, SLC panelists advised. *Monitor on Psychology, 38*(5), 38–39.

Cytowic, R. E. (1993). *The man who tasted shapes.* Cambridge, MA: MIT Press.

Dabbs, J. M. (2000). *Heroes, rogues, and lovers: Testosterone and behavior.* New York, NY: McGraw-Hill.

Dackman, L. (1986). Everyday illusions. *Exploratorium Quarterly, 10,* 5–7.

Dadds, M. R., & Fraser, J. A. (2006). Fire interest, fire setting and psychopathology in Australian children: A normative study. *Australian and New Zealand Journal of Psychiatry, 40,* 581–586.

Daily, D. K., Ardinger, H. H., & Holmes, G. E. (2000). Identification and evaluation of mental retardation. *American Family Physician, 61,* 1059–1067.

Daley, K. C. (2004). Update on attention-deficit/hyperactivity disorder. *Current Opinion in Pediatrics, 16,* 217–226.

Daley, T. C., Whaley, S. E., Sigman, M. D., Espinosa, M. P., & Neumann, C. (2003). IQ on the rise: The Flynn effect in rural Kenyan children. *Psychological Science, 14,* 215–219.

Dally, J. M., Emery, N. J., & Clayton, N. S. (2005). Cache protection strategies by western scrub-jays *(Aphelocoma californica):* Implications for social cognition. *Animal Behaviour, 70,* 1251–1263.

Dalton, A. (2010, October 26). Study: Half of teens admit bullying in last year. *Associated Press.*

Daly, R. C., Su, T.-P., Schmidt, P. J., Pagliaro, M., Pickar, D., & Rubinow, D. R. (2003). Neuroendocrine and behavioral effects of high-dose anabolic steroid administration in male normal volunteers. *Psychoneuroendocrinology, 28,* 317–331.

Damasio, A. R. (1994). *Descartes' error: Emotion, reason, and the human brain.* New York, NY: Avon Books.

Damasio, A. R. (1999, December). How the brain creates the mind. *Scientific American, 281*(6), 112–117.

Damasio, A. R. (2000). *The feeling of what happens: Body and emotion in the making of consciousness.* New York, NY: Harcourt Brace.

Damasio, A. R. (2003). *Looking for Spinoza: Joy, sorrow, and the feeling brain.* Orlando, FL: Harcourt. [See also LeDoux, 1996; Whalen, 1998]

Dana, R. H. (1993). *Multicultural assessment perspectives for professional psychology.* Boston, MA: Allyn & Bacon.

Danion, J., Rizzo, L., & Bruant, A. (1999). Functional mechanisms underlying im paired recognition memory and conscious awareness in patients with schizophrenia. *Archives of General Psychiatry, 56,* 639–644.

Dannefer, D., & Perlmutter, M. (1990). Developmental as a multidimensional process: Individual and social constit uents. *Human Development, 33,* 108–137.

Danner, D. D., Snowdon, D. A., & Friesen, W. V. (2001). Positive emotions in early life and longevity: Findings from the nun study. *Journal of Personality and Social Psychology, 80,* 804–813.

Dapretto, M., Davies, M. S., Pfeifer, J. H., Scott, A. A., Sigman, M., Bookheimer, S. Y., & Iocoboni, M. (2006). Understanding emotions in others: Mirror neuron dysfunction in children with autism spectrum disorders. *Nature Neuroscience, 9*(1), 28–30.

Darley, J. M., & Latané, B. (1968). Bystander intervention in emergencies: diffusion of responsibility. *Journal of Personality and Social Psychology, 8*(4p1), 377.

Darwin, C. (1862/1998). *The expression of the emotions in man and animals* (3rd ed., with Introduction, Afterword, and Commentaries by P. Ekman). New York, NY: Oxford University Press. (Original work published 1862)

Darwin, C. (1963). *On the origin of species.* London, England: Oxford University Press. (Original work published 1859)

Davidson, P. S. R., Cook, S. P., Clisky, E. L., Verfaellie, M., & Rapcsak, S. Z. (2005). Source memory in the real world: A neuropsychological study of flash-bulb memory. *Journal of Clinical and Experimental Neuropsychology, 27,* 915–929.

Davidson, R. J. (1992a). Anterior cerebral asymmetry and the nature of emotion. *Brain and Cognition, 20,* 125–151.

Davidson, R. J. (1992b). Emotion and affective style: Hemispheric substrates. *Psychological Science, 3,* 39–43.

Davidson, R. J. (2000a). Affective neuroscience. Address given at the American Psychological Association's annual convention, Washington, DC.

Davidson, R. J. (2000b). Affective style, psychopathology, and resilience: Brain mechanisms and plasticity. *American Psychologist, 55,* 1196–1214.

Davidson, R. J., & Begley, S. (2012). *The emotional life of your brain: How its unique patterns affect the way you think, feel, and live—and how you can change them.* New York, NY: Plume.

Davidson, R. J., Jackson, D. C., & Kalin, N. H. (2000). Emotion, plasticity, context, and regulation: Perspectives from affective neuroscience. *Psychological Bulletin, 126,* 890–909. [See also: Adolphs et al., 2001; Ahern & Schwartz, 1985; Borod et al., 1988.]

Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F., . . . Sheridan, J. F. (2003). Alternations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine, 65,* 564–570.

Davis, C. G., Nolen-Hoeksema, S., & Larson, J. (1998). Making sense of loss and benefiting from the experience: Two construals of meaning. *Journal of Personality and Social Psychology, 75,* 561–574.

Davis, J. L., & Rusbult, C. E. (2001). Attitude alignment in close relationships. *Journal of Personality & Social Psychology, 81,* 65–84.

Davison, K. P., Pennebaker, J. W., & Dickerson, S. S. (2000). Who talks? The social psychology of illness support groups. *American Psychologist, 55,* 205–217.

Daw, J. (2001, June). The Ritalin debate. *Monitor on Psychology, 32*(6), 64–65.

Dawes, R. M. (2001). *Everyday irrationality: How pseudoscientists, lunatics, and the rest of us fail to think rationally.* Boulder, CO: Westview Press.

Dawkins, K., Lieberman, J. A., Lebowitz, B. D., & Hsiao, J. K. (1999). Antipsychotics: Past and future. *Schizophrenia Bulletin, 25,* 395–405. [See also: Gitlin, 1990; Holmes, 2001; Kane & Marder, 1993.]

Day, N. L. (2002). Prenatal alcohol exposure predicts continued deficits in offspring size at 14 years of age. *Alcoholism: Clinical and Experimental Research, 26,* 1584–1591.

DeAngelis, T. (2002a, June). A bright future for PNI. *Monitor on Psychology,* 46–50.

DeAngelis, T. (2002b, July–August). If you do just on thing, make it exercise. *Monitor on Psychology,* 4–51.

DeAngelis, T. (2002c, February). New data on lesbian, gay, and bisexual mental health. *Monitor on Psychology, 33*(2), 46–47.

DeAngelis, T. (2004a, January). Family-size portions for one. *Monitor on Psychology, 35*(1), 50–51.

DeAngelis, T. (2004b, January). What's to blame for the surge in super-size Americans? *Monitor on Psychology, 35*(1), 46–49. [See also: Abelson & Kennedy, 2004; Marx, 2003; Newman, 2004; Taubes, 1998; Wickelgren, 1998c.]

DeAngelis, T. (2005, November). Where psychotherapy meets neuroscience. *Monitor on Psychology, 36*(11), 72–73.

DeAngelis, T. (2006, February). Promising new treatments for SAD. *Monitor on Psychology, 37*(2), 18–20.

DeAngelis, T. (2008a, February). When do meds make the difference? *Monitor on Psychology, 39*(2), 48–53.

DeAngelis, T. (2008b, October). One treatment for emotional disorders? Research suggests that a single protocol can successfully treat all anxiety and mood disorders. *Monitor on Psychology, 39*(9), 26–27.

DeAngelis, T. (2009, November 1). Understanding terrorism. *Monitor on Psychology, 40*, 60ff.

DeAngelis, T. (2010, June). Closing the gap between practice and research: Two efforts are addressing the reasons practitioners may not always use research findings. *Monitor on Psychology, 41*, 42–45.

DeCasper, A. J., & Spence, M. J. (1986). Prenatal maternal speech influences newborns' perception of speech sounds. *Infant Behavior and Development, 9*, 133–150.

Decety, J., & Cacioppo, J. T. (2011). *Handbook of social neuroscience.* New York, NY: Oxford University Press.

Deckers, L. (2001). *Motivation: Biological, psychological, and environmental.* Boston, MA: Allyn & Bacon.

de Gelder, B. (2000, August 18). More to seeing than meets the eye. *Science, 289*, 1148–1149. [See also: Barinaga, 1999; Batista et al., 1999; Maunsell, 1995.]

de Gelder, B. (2010, May). Uncanny sight in the blind. *Scientific American, 302*(5), 60–65.

de Groot, A. D. (1965). *Thought and choice in chess.* The Hague: Mouton.

De Houwer, J., Thomas, S., & Baeyens, F. (2001). Association learning of likes and dislikes: A review of 25 years of research on human evaluative conditioning. *Psychological Bulletin, 127*(6), 853–869.

Delaney, P. F., Sahakyan, L., Kelley, C. M., & Zimmerman, C. A. (2010). Remembering to forget: The amnesic effect of daydreaming. *Psychological Science, 21*(7), 1036–1042.

Delgado, J. M. R. (1969). *Physical control of the mind: Toward a psychocivilized society.* New York, NY: Harper & Row.

DeLoss, D. J., Watanabe, T., & Andersen, G. J. (2015). Improving vision among older adults: Behavioral training to improve sight. *Psychological Science.* Advance online publication. doi:10.1177/0956797614567510

De Martino, B., Kumaran, D., Seymour, B., & Dolan, R. J. (2006, August 4). Frames, biases, and rational decision-making in the human brain. *Science, 313*, 684–687.

Dement, W. C. (1980). *Some watch while some must sleep.* San Francisco, CA: San Francisco Book Company.

Dement, W. C. (2000, September 25). Sleep debt. Retrieved from SleepQuest website: www.sleepquest.com/d_column_archive6.html

Dement, W. C., & Kleitman, N. (1957). Cyclic variations in EEG during sleep and their relations to eye movement, body mobility and dreaming. *Electro encephalography and Clinical Neurophysiology, 9*, 673–690.

Dement, W. C., & Vaughan, C. (1999). *The promise of sleep.* New York, NY: Delacorte Press.

DeMeyer, G., Shapiro, F., Vanderstichele, H., Vanmechelen, E., Engelborghs, S., DeDeyn, P. P., . . . Trojanowki, J. Q. (2010). Diagnosis-independent Alzheimer disease biomarker signature in cognitively normal elderly people. *Archives of Neurology, 67*, 949–956.

Dennis, W. (1960). Causes of retardation among institutionalized children: Iran. *Journal of Genetic Psy chology, 96*, 47–59.

Dennis, W., & Dennis, M. G. (1940). The effect of cradling practices upon the onset of walking in Hopi children. *Journal of Genetic Psychology, 56*, 77–86.

DePaulo, B. M., Lindsay, J. J., Malone, B. E., Muhlenbruck, L., Charlton, K., & Cooper, H. (2003). Cues to deception. *Psychological Bulletin, 129*, 74–118.

De Pelsmacker, P., & Geuens, M. (2014). The communication effects of warmth, eroticism and humour in alcohol advertisements. *Journal of Marketing Communications, 2*(4), 247–262.

Derbyshire, S. W. G., Whalley, M. G., Stenger, V. A., & Oakley, D. A. (2004). Cerebral activation during hypnotically induced and imagined pain. *Neuro image, 23*, 392–401.

Deregowski, J. B. (1980). *Illusions, patterns and pictures: A cross-cultural perspective* (pp. 966–977). London, U.K.: Academic Press.

Dermietzel, R. (2006, October/November). The electrical brain. *Scientific American Mind, 17*(5), 56–61.

DeRubeis, R. J., Hollon, S. D., Amsterdam, J. D., Shelton, R. C., Young, P. R., Salomon, R. M., . . . Gallop, R. (2005). Cognitive therapy vs. medications in the treatment of moderate to severe depression. *Archives of General Psychiatry, 62*, 409–416.

DeSalvo, L. (2000). *Writing as a way of healing: How telling our stories transforms our lives.* Boston, MA: Beacon Press.

DeStefano, F., Price, C. S., & Weintraub, E. S. (2013). Increasing exposure to antibody-stimulating proteins and polysaccharides in vaccines is not associated with risk of autism. *Journal of Pediatrics, 163*(2), 561–567.

Deutsch, M., & Collins, M. E. (1951). *Interracial housing: A psychological evaluation of a social experiment.* Minneapolis: University of Minnesota Press.

Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influence upon individual judgment. *Journal of Abnormal and Social Psychology, 51*, 629–636.

Devereux, G. (1981). *Mohave ethnopsychiatry and suicide: The psychiatric knowledge and psychic disturbances of an Indian tribe.* Bureau of American Ethology Bulletin 175. Washington, DC: Smithsonian Institution.

Devilly, G. J., Gist, R., & Cotton, P. (2006). Ready! Fire! Aim! The status of psychological debriefing and therapeutic interventions: In the work place and after disasters. *Review of General Psychology, 10*, 318–345.

Devine, P. G., & Zuwerink, J. R. (1994). Prejudice and guilt: The internal struggle to overcome prejudice. In W. J. Lonner & R. Malpass (Eds.), *Psychology and culture* (pp. 203–207). Boston, MA: Allyn & Bacon.

Devor, H. (1993). Sexual orientation identities, attractions, and practices of female-to-male transsexuals. *Journal of Sex Research, 30*, 303–315.

de Waal, F. B. M. (1999, December). The end of nature versus nurture. *Scientific American, 281*(6), 94–99.

DeWall, C. N., Macdonald, G., Webster, G. D., Masten, C. L., Baumeister, R. F., Powell, C., . . . Eisenberger, N. I. (2010). Tylenol reduces social pain: Behavioral and neural evidence. *Psychological Science, 21*, 931–937.

Dewsbury, D. A. (1990). Early interactions between animal psychologists and animal activists and the founding of the APA Committee on Precautions in Animal Experimentation. *American Psychologist, 45*, 315–327.

Dewsbury, D. A. (1996) Beatrix Tugendhat Gardner (1933–1995): Obituary. *American Psychologist, 51*(12), 1332.

Dewsbury, D. A. (1997). In celebration of the centennial of Ivan P. Pavlov's (1897/1902) *The work of the digestive glands*. *American Psychologist, 52*, 933–935.

Diamond, L. (2008). Female bisexuality from adolescence to adulthood: Results from a 10-year longitudinal study. *Developmental Psychology, 44*, 5–14.

Diamond, L. M. (2012). The desire disorder in research on sexual orientation in women: contributions of dynamical systems theory. *Archives of Sex Behavior, 41*(1), 73–83.

Diamond, M. (2007). *Psychosexual development—male or female?* Address given at the 2007 convention of the American Psychological Association in San Francisco.

Dickens, W. T., & Flynn, J. R. (2001). Heritability estimates versus large environmental effects: The IQ paradox resolved. *Psychological Review, 108,* 346–369.

Dickens, W. T., & Flynn, J. R. (2006). Black Americans reduce the racial IQ gap: Evidence from standardization samples. *Psychological Science, 17,* 913–920.

Dickinson, A. (2001). Causal learning: Association versus computation. *Current Directions in Psychological Science, 10,* 127–132.

Diehl, M., Coyle, N., & Labouvie-Vief, G. (1996). Age and sex differences in strategies of coping and defense across the life span. *Psychology and Aging, 11,* 127–139.

Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95,* 542–575.

Diener, E. (2000). Subjective well-being: The science of happiness and a proposal for a national index. *American Psychologist, 55,* 34–43.

Diener, E., & Diener, C. (1996). Most people are happy. *Psychological Science, 7,* 181–189.

Diener, E., Sandvik, E., Seidlitz, L., & Diener, M. (1993). The relationship between income and subjective well-being: Relative or absolute? *Social Indicators Research, 28,* 195–223.

Diener, E., & Seligman, M. E. P. (2002). Very happy people. *Psychological Science, 13,* 81–84.

DiFebo, H. (2002). *Psyography: Mary Whiton Calkins.* Retrieved from http://faculty.frostburg.edu/mbradley/psyography/marywhitoncalkins.html.

Dijksterhuis, A. (2004). Think different: The merits of unconscious thought in preference development and decision making. *Journal of Personality and Social Psychology, 87,* 586–598.

Dillard, A. J. (2007). Humor, laughter, and recovery from stressful experiences. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 68*(5-B), 3432.

Dingfelder, S. F. (2004a, July/August). Gateways to memory. *Monitor on Psychology, 35*(7), 22–23. [See also: Azar, 1998a; Holloway, 1999.]

Dingfelder, S. F. (2004b, March). Pavlovian psychopharmacology. *Monitor on Psychology, 35*(3), 18–19.

Dingfelder, S. F. (2004c, March). To tell the truth. *Monitor on Psychology, 35*(3), 22–23. [See also: Aftergood, 2000; Holden, 2001b; Saxe, 1991, 1994.]

Dingfelder, S. F. (2005, September). Feelings' sway over memory. *Monitor on Psychology, 36*(8), 54–55.

Dingfelder, S. F. (2006, June). The formula for funny. *Monitor on Psychology, 37*(6), 54–56.

Dingfelder, S. F. (2007, January). Phantom pain and the brain. *Monitor on Psychology, 38*(1), 22–23.

Dingfelder, S. F. (2010). The scientist at the easel. *Monitor on Psychology, 41*(2), 34–38. Retrieved from www.apa.org/monitor/2010/02/painters.aspx.

Dion, K. K. (1986). Stereotyping based on physical attractiveness: Issues and conceptual perspectives. In C. P. Herman, M. P. Zanna, & E. T. Higgins (Eds.), *Physical appearance, stigma, and social behavior: The Ontario symposium on personality and social psychology (Vol. 3).* Hillsdale, NJ: Erlbaum.

Dishman, R. K. (1988). Overview. In R. K. Dishman (Ed.), *Exercise adherence: Its impact on public health.* Champaign IL: Human Kinetics. doi: 10.1016/j.bbi.2008.11.006

Dismukes, R. K. (2012). Prospective memory in workplace and everyday situations. *Current Directions in Psychological Science*, 21(4), 215.

Dittmann, M. (2003). Psychology's first prescribers. *Monitor on Psychology, 34*(2), 36.

Dittmann, M. (2004). Prescriptive authority. *Monitor on Psychology, 35*(5), 34–35.

Dittmann, M. (2005, July/August). When health fears hurt health. *Monitor on Psychology, 36*(7), 100–103.

Dixon, R. A., Kramer, D. A., & Baltes, P. B. (1985). Intelligence: A life-span developmental perspective. In B. B. Wolman (Ed.), *Handbook of intelligence* (pp. 301–352). New York, NY: Wiley.

D'Mello, M. J., Ross, S. A., Briel, M., Anand, S.S., Gerstein, H., & Paré, G. (2015). Association between shortened leukocyte telomere length and cardio-metabolic outcomes: Systematic review and meta-analysis. *Circulation: Cardiovascular Genetics*, *8*(1), 82–90.

Do, D. P., Pai, S. B., Rizvi, S. A., & D'Souza, M. J. (2010). Development of sulforaphane-encapsulated microspheres for cancer epigenetic therapy. *International Journal of Pharmaceutics, 386,* 114–121.

Dobbins, A. C., Jeo, R. M., Fiser, J., & Allman, J. M. (1998, July 24). Distance modulation of neural activity in the visual cortex. *Science, 281,* 552–555.

Dobbs, D. (2006a). A revealing reflection. *Scientific American Mind, 17*(2), 22–27.

Dobbs, D. (2006b, August/September). Turning off depression. *Scientific American, 17*(4), 26–31.

Dodson, C. S., Johnson, M. K., & Schooler, J. W. (1997). The verbal overshadowing effect: Why descriptions impair face recognition. *Memory & Cognition, 25,* 129–139.

Dohrenwend, B. P., & Shrout, P. E. (1985). "Hassles" in the conceptualization and measurement of life stress variables. *American Psychologist, 40,* 780–785.

Doka, K. J. (1989). *Disenfranchised grief: Recognizing hidden sorrows.* Lexington, MA: Lexington Books.

Doka, K. J. (1995). Friends, teachers, movie stars: The disenfranchised grief of children: Friends, teachers, movie stars. In E. A. Grollman (Ed.), *Bereaved children and teens: A support guide for parents and professionals* (pp. 37–45). Boston, MA: Beacon Press.

Dolan, R. J. (2002). Emotion, cognition, and behavior. *Science, 298,* 1191–1194.

Doll, C., McLaughlin, T. F., & Barretto, A. (2013). The token economy: A recent review and evaluation. *International Journal of Basic and Applied Science, 2*(1), 131–149.

Domhoff, G. W. (1996). *Finding meaning in dreams: A quantitative approach.* New York, NY: Plenum Press.

Doob, L. W. (1964). Eidetic images among the Ibo. *Ethnology, 3,* 357–363.

Doré, B., Ort, L., Braverman, O., & Ochsner, K. N. (2015). Sadness shifts to anxiety over time and distance from the national tragedy in Newtown, Connecticut. *Psychological Science.* doi: 10.1177/0956797614562218

Doucleff, M. (2014). Rice Theory: Why Eastern cultures are more cooperative. NPR. Retrieved from http://www.npr.org/sections/thesalt/2014/05/08/310477497/rice-theory-why-eastern-cultures-are-more-cooperative

Dowling, J. E. (1992). *Neurons and networks: An introduction to neuroscience.* Cambridge, MA: Harvard University Press.

Downey, T. (2004). *The last men out: Life on the edge at Rescue 2 Firehouse.* New York, NY: Henry Holt and Co.

Downing, J., & Bellis, M. A. (2009). Early pubertal onset and its relationship with sexual risk taking, substance use and anti-social behaviour: A preliminary cross-sectional study. *BMC Public Health, 9,* 446.

Downing, P. E., Jiang, Y., Shuman, M., & Kanwisher, N. (2001, 28 September). A cortical area selective for visual processing of the human body. *Science, 293,* 2470–2473.

Doyère, V., Débiec, J., Monfils, M.-H., Schafe, G. E., & LeDoux, J. E. (2007, November 1). Synapse-specific recon-solidation of distinct fear memories in the lateral amygdala. *Nature Neuroscience, 10,* 414–416. [See also: Riccio et al., 2003; Wixted, 2005.]

Doyle, R. (2001, June). The American terrorist. *Scientific American, 285*(6), 28.

Doyle, R. (2002a). Deinstitutionalization: Why a much maligned program still has life. *Scientific American, 287,* 38.

Doyle, R. (2002b, January). Going solo: Unwed mother-hood in industrial nations rises. *Scientific American, 286*(1), 24.

Doyle, R. (2006, February). Sizing up: Roots of obesity epidemic lie in the mid-20th century. *Scientific American, 294*(2), 32.

Doyle, R. (2007, January). Teen sex in America: Virginity into the third millennium takes an uptick. *Scientific American, 296*(1), 30.

Draguns, J. (1980). Psychological disorders of clinical severity. In H. Triandis & J. Draguns (Eds.), *Handbook of cross-cultural psychology, Vol. 6: Psychopathology* (pp. 99–174). Boston, MA: Allyn & Bacon.

Draguns, J. G. (1979). Culture and personality. In A. J. Mar-sella, R. G. Tharp, & T. J. Ciborowski (Eds.), *Perspectives on cross-cultural psychology* (pp. 179–207). New York, NY: Academic Press.

Driscoll, E. V. (2008, June/July). Bisexual species. *Scientific American Mind, 19*(3), 68–73.

Druckman, D., & Bjork, R. A. (1991). *In the mind's eye: Enhanc-ing human performance.* Washington, DC: National Academy Press.

Duenwald, M. (2005, March). Building a better grapefruit. *Discover, 26*(3), 26–27.

Dugoua, J., Mills, E., Perri, D., & Koren, G. (2006). Safety and efficacy of ginkgo *(Ginkgo biloba)* during pregnancy and lactation. *Canandian Journal of Clinical Pharmacology, 13,* e277–e284.

Duncan, J., Seitz, R. J., Kolodny, J., Bor, D., Herzog, H., Ahmed, A., Newell, F. N., & Emslie, H. (2000, July 21). A neural basis for general intelligence. *Science, 289,* 457–460.

Dunn, K. (2006, December). Runners-up: John Donoghue, neuroscientist at Brown University. *Discover, 27*(2), 39.

Durlak, J. A., & Weissberg, R. P. (2011). Promoting social and emotional development is an essential part of students' edu-cation. *Human Development, 54,* 1–3. doi: 10.1159/000324337

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011, January/February). The impact of enhancing students' social and emotional learning: a meta-analysis of school-based universal interventions. *Child Development, 82*(1), 405–432.

Dutton, D. G., & Aron, A. P. (1974). Some evidence for height-ened sexual attraction under conditions of high anxiety. *Journal of Personality and Social Psychology, 30,* 510–517.

Dutton, E., & Lynn, R. (2013). A negative Flynn effect in Fin-land, 1997–2009. *Intelligence, 41,* 817–820.

Dweck, C. (2006). *Mindset: The new psychology of success.* New York, NY: Random House.

Dweck, C. (2007). *Mindsets: The new psychology of success.* New York, NY: Ballantine.

Dweck, C. (2008). *Mindsets and math/science achievement.* New York, NY: The Carnegie.

Dweck, C. S. (December 2007/January 2008). The secret to raising smart kids. *Scientific American Mind, 18*(6), 37–43.

Dykema, J., Bergbower, K., & Peterson, C. (1995). Pessimistic explanatory style, stress, and illness. *Journal of Social and Clinical Psychology, 14,* 357–371.

Eagly, A. H. (1987). *Sex differences in social behavior: A social-role interpretation.* Hillsdale, NJ: Erlbaum.

Eagly, A. H., Ashmore, R. D., Makhijani, M. G., & Kennedy, L. C. (1991). What is beautiful is good, but . . .: A meta-analytic review of the social psychological literature. *Psychological Bulletin, 100,* 283–308. [See also: Dion, 1986; Hatfield & Sprecher, 1986.]

Eagly, A. H., & Carli, L. L. (1981). Sex of researchers and sex-typed communications as determinants of sex differences in influenceability: A meta-analysis of social influence studies. *Psychological Bulletin, 90,* 1–20.

Eagly, A. H., & Wood, W. (1999). The origins of sex differences in human behavior: Evolved dispositions versus social roles. *American Psychologist, 54,* 408–423.

Ebbinghaus, H. (1908/1973). *Psychology: An elementary text-book.* New York, NY: Arno Press. (Original work published 1908.)

Eberhardt, J. L., & Hetey, R. C. (2014). Racial disparities in incarceration increase acceptance of punitive policies. *Psychological Science.* doi:10.1177/0956797614540307

Eberhardt, J. L., & Randall, J. L. (1997). The essential notion of race. *Psychological Science, 8,* 198–203.

Eberhardt, J. L., & Rattan, A. (2010). The role of social meaning in inattentional blindness: When the gorillas in our midst do not go unseen. *Journal of Experimental Social Psychology, 46*(6), 1085–1088. doi:10.1016/j.jesp.2010.06.010. ISSN 0022-1031.

Eckensberger, L. H. (1994). Moral development and its measurement across cultures. In W. J. Lonner & R. Malpass (Eds.), *Psychology and culture* (pp. 71–78). Boston, MA: Allyn & Bacon.

Edwards, A. E., & Acker, L. E. (1962). A demonstration of the long-term retention of a conditioned galvanic skin response. *Psychosomatic Medicine, 24,* 459–463.

Edwards, K. J., Hershberger, P. J., Russell, R. K., & Markert, R. J. (2001). Stress, negative social exchange, and health symptoms in university students. *Journal of American College Health, 50,* 75–86.

Ehrlich, P. R. (2000a). *Genes, cultures and the human prospect.* Washington, DC: Island Press.

Ehrlich, P. R. (2000b, September 22). The tangled skeins of nature and nurture in human evolution. *The Chronicle of Higher Education,* B7–B11.

Eich, E., Macaulay, D., Loewenstein, R. J., & Dihle, P. H. (1997). Memory, amnesia, and dissociative identity disorder. *Psychological Science, 8,* 417–422.

Einstein, G. O., & McDaniel, M. A. (2005). Prospective memory: Multiple retrieval processes. *Current Directions in Psychological Science 14,* 286–290.

Eisenberg, N., Hofer, C., Sulik, M. J., & Liew, J. (2014). The development of prosocial moral reasoning and a prosocial orientation in young adulthood: Concurrent and

longitudinal correlates. *Developmental Psychology, 50*(1), 58–70. doi: 10.1037/a0032990

Eisenberger, N. I . (2012). The neural bases of social pain: evidence for shared representations with physical pain. *Psychosomatic Medicine, 74*(2), 126–135.

Eisenberger, N. I. (2013a). An empirical review of the neural underpinnings of receiving and giving social support: implications for health. *Psychosomatic Medicine, 75*(6), 545–556.

Eisenberger, N. I. (2013b). Social ties and health: a social neuroscience perspective. *Current Opinion in Neurobiology, 8*(3), 407–413. doi: 10.1016/j.conb.2013.01.006

Eisenberger, R., & Cameron, J. (1996). Detrimental effects of reward: Reality or myth? *American Psychologist, 51,* 1153–1166.

Eisler, R., & Levine, D. S. (2002). Nurture, nature, and caring: We are not prisoners of our genes. *Brain and Mind, 3,* 9–52.

Ekman, P. (1984). Expression and the nature of emotion. In K. R. Scherer & P. Ekman (Eds.), *Approaches to emotion.* Hillsdale, NJ: Erlbaum.

Ekman, P. (1992). Facial expressions of emotion: New findings, new questions. *Psychological Science, 3,* 34–38.

Ekman, P. (1993). Facial expression and emotion. *American Psychologist, 48,* 384–392.

Ekman, P. (1994). Strong evidence for universals in facial expressions: A reply to Russell's mistaken critique. *Psychological Bulletin, 115,* 268–287.

Ekman, P. (2003). *Emotions revealed: Recognizing faces and feelings to improve communication and emotional life.* New York, NY: Times Books, Henry Holt and Company. [See also: Ekman, 1984, 1992, 1993; Ekman & Friesen, 1971, 1986; Ekman & Rosenberg, 1997; Ekman et al., 1969, 1987; Keating, 1994.]

Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology, 17,* 124–129.

Ekman, P., & Friesen, W. V. (1986). A new pan-cultural facial expression of emotion. *Motivation and Emotion, 10,* 159–168.

Ekman, P., Friesen, W. V., O'Sullivan, M., Chan, A., Diacoyanni-Tarlatzis, I., Heider, K., Krause, R., LeCompte, W. A., Pitcairn, T., Ricci-Bitti, P. E., Scherer, K., Tomita, M., & Tzavaras, A. (1987). Universal and cultural differences in the judgments of facial expressions of emotion. *Journal of Personality and Social Psychology, 53,* 712–717.

Ekman, P., & Rosenberg, E. (1997). *What the face reveals.* New York: Oxford University Press.

Ekman, P., Sorenson, E. R., & Friesen, W. V. (1969). Pan-cultural elements in facial displays in emotion. *Science, 764,* 86–88.

Elbert, T., Pantev, C., Wienbruch, C., Rockstroh, B., & Taub, E. (1995, October 13). Increased cortical representation of the fingers of the left hand in string players. *Science, 270,* 305–307.

Elfenbein, H. A., & Ambady, N. (2003). Universals and cultural differences in recognizing emotions. *Current Directions in Psychological Science, 12,* 159–164.

Elias, C. L., & Berk, L. E. (2002). Self-regulation in children: Is there a role for sociodramatic play? *Early Childhood Research Quarterly, 17*(2), 216–238.

Elliott, G. R., & Eisdorfer, C. (Eds.). (1982). *Stress and human health: Analysis and implications of research (A study by the Institute of Medicine/National Academy of Sciences).* New York, NY: Springer.

Ellis, A. (1987). *The practice of rational emotive therapy (RET).* New York, NY: Springer.

Ellis A. (1990). *The essential Albert Ellis: Seminal writings on psychotherapy.* New York, NY: Springer.

Ellis, A. (1996). *Better, deeper, and more enduring brief therapy: The rational emotive behavior therapy approach.* New York, NY: Brunner/Mazel.

Ellison, J. (1984, June). The seven frames of mind. *Psychology Today, 18,* 21–24, 26.

Ellsworth, P. C. (1994). William James and emotion: Is a century of fame worth a century of misunderstanding? *Psychological Review, 101,* 222–229.

Elzamzamy, K., & Patel, S. (2015, March). *Muslim historical contributions to psychological theories and treatment.* Poster session presented at the seventh annual Muslim Mental Health conference, Dearborn, MI. Retrieved from https://www.academia.edu/11814393/Muslim_Historical_Contributions_to_Psychological_Theories_and_Treatment

Emberson, L. L., Lupyan, G., Goldstein, M. H., & Spivey, M. J. (2010, October). Overheard cell-phone conversations: When less speech is more distracting. *Psychological Science 21*(10), 1383–1388. doi:10.1177/0956797610382126

Engle, R. W. (2002). Working memory capacity as executive attention. *Current Directions in Psychological Science, 11,* 19–23.

Ennemoser, M., & Schneider, W. (2007). Relations of television viewing and reading: Findings from a 4-Year longitudinal study. *Journal of Educational Psychology, 99,* 349–368.

Ennis, M., Kelly, K. S., & Lambert, P. L. (2001). Sex differences in cortisol excretion during anticipation of a psychological stressor: Possible support for the tend-and-befriend hypothesis. *Stress and Health, 17,* 253–261.

Epel, E. S., Blackburn, E. H., Lin, J., Dhabhar, F. S., Adler, N. E., Morrow, J. D., & Cawthon, R. M. (2004, December 7). Accerated telomere shortening in response to life stress. *Proceedings of the National Academy of Science, 101,* 17, 312–17, 315.

Epel, E. S., Blackburn, E. H., Lin, J., Dhabhar, F. S., Adler, N. E., Morrow, J. D., & Cawthon, R. M. (2004, December 7). Accelerated telomere shortening in response to life stress. *Proceedings of the National Academy of Sciences of the United States of America, 101,* 17312–17315.

Epstein, R. A. (2014). Neural systems for visual scene recognition. In M. Bar & K. Keveraga (Eds.). *Scene vision* (pp. 105–134). Cambridge, MA: MIT Press. Retrieved from http://www.psych.upenn.edu/epsteinlab/pdfs/Epstein_Visual_Scene_Recognition_Chapter.pdf

Epstein, R. A., & MacEvoy, S. P. (2011). Constructing scenes from objects in human occipitotemporal cortex. *Nature Neuroscience, 14,* 1323–1329. Retrieved from http://www.psych.upenn.edu/epsteinlab/pdfs/MacEvoy_and_Epstein_2011_Constructing_scenes_from_objects_in_human_occipitotemporal_cortex.pdf

Epstein, S. (1980). The stability of confusion: A reply to Mischel and Peake. *Psychological Review, 90,* 179–184.

Erdberg, P. (1990). Rorschach assessment. In G. Goldstein & M. Hersen (Eds.), *Psychological assessment* (2nd ed.). New York, NY: Pergamon.

Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. *American Psychologist, 49,* 725–747.

Ericsson, K. A., Charness, N., Feltovich, P. J., & Hoffman, R. R. (Eds.). (2006). *The Cambridge handbook of expertise and*

*expert performance.* New York, NY: Cambridge University Press. [See also: Bransford et al., 1986; Gardner, 1993; Glaser, 1984; Greeno, 1989; Klahr & Simon, 2001; Mayer, 1983; Who Wants to Be a Genius?, 2001.]

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100,* 363–406.

Erikson, E. H. (1963). *Childhood and society* (2nd ed.). New York, NY: Norton.

Erlich, N., Lipp, O. V., & Slaughter, V. (2013, August 27), Of hissing snakes and angry voices: human infants are differentially responsive to evolutionary fear-relevant sounds. *Developmental Science, 16,* 894–904. doi: 10.1111/desc.12091

Evans, G. W., Bullinger, M., & Hygge, S. (1998). Chronic noise exposure and physiological response: A prospective study of children living under environmental stress. *Psychological Science, 9,* 75–77.

Everitt, B. J., & Robbins, T. W. (2005). Neural systems of reinforcement for drug addiction: From actions to habits to compulsion. *Nat Neurosci, 8*(11), 1481–1489.

Ezzell, C. (2003, February). Why??? The neuroscience of suicide. *Scientific American, 288,* 45–51. [See also: Hirschfeld & Goodwin, 1988; Nemeroff, 1998.]

Fadiman, J., & Frager, R. (2001). *Personality and personal growth.* Upper Saddle River, NJ: Prentice Hall.

Fallon, A., & Rozin, P. (1985). Sex differences in perceptions of desirable body states. *Journal of Abnormal Psychology, 94,* 102–105.

Fagnani, C., Medda, E., Stazi, M. A., Caprara, G. V., & Alessandri, G. (2014). Investigation of age and gender effects on positive orientation in Italian twins. *International Journal of Psychology, 49*, 453–461.

Fajans, J. (1985). In G. M. White (Ed.), *The person in social context.* Berkeley, CA: University of California Press. Retrieved from http://anthropology.cornell.edu/people/detail.cfm?netid=jf20

Fakhouri, T. H. I., Hughes, J. P., Burt, V. L., Song, M., Fulton, J. E., & Ogden, C. L. (2014). *Physical activity in U.S. youth aged 12-15 years, 2012.* Retrieved from http://www.cdc.gov/nchs/data/databriefs/db141.pdf

Fancher, R. E. (1979). *Pioneers of psychology.* New York, NY: W. W. Norton.

Fantz, R. L. (1963). Pattern vision in newborn infants. *Science, 140,* 296–297.

Farah, M. J., Betancourt, L., Shera, D. M., Savage, J. H., Giannetta, J. M., Brodsky, N. L., . . . Hurt, H. (2008). Environmental stimulation, parental nurturance and cognitive development in humans. *Developmental Science, 11*(5), 793–801.

Faraone, S. V., Sergeant, J., Gillberg, C., & Biederman, J. (2003). The worldwide prevalence of ADHD: Is it an American condition? *World Psychiatry, 2,* 104–113.

Farina, A., Fischer, E. H., Boudreau, L. A., & Belt, W. E. (1996). Mode of target presentation in measuring the stigma of mental disorder. *Journal of Applied Social Psychology, 26,* 2147–2156.

Faris, R., & Felmlee, D. (2011). Status struggles: Network centrality and gender segregation in same and cross-gender aggression. *American Sociological Review, 76*, 48–73.

Fariva, R. (2009). Dorsal–ventral integration in object recognition. *Brain Research Reviews, 61,* 144–153.

Faulkner, A. H., & Cranston, K. (1998). Correlates of same-sex sexual behavior in a random sample of Massachusetts high school students. *American Journal of Public Health, 88*(2), 262–266.

Faulkner, M. (2001). The onset and alleviation of learned helplessness in older hospitalized people. *Aging and Mental Health, 5,* 379–386.

Feingold, A. (1988). Matching for attractiveness in romantic partners and same-sex friends: A meta-analysis and theoretical critique. *Psychological Bulletin, 104,* 226–235. [See also: Cash & Killcullen, 1985; Folkes, 1982; Hatfield & Sprecher, 1986.]

Feingold, A. (1990). Gender differences in effects of physical attractiveness on ro mantic attraction: A comparison across five research paradigms. *Journal of Personality and Social Psychology, 59,* 981–993.

Fentress, A. (2012, August 30). Marcus Mariota: Focused, laid-back leader Oregon Ducks are ready to follow. *The Oregonian.* Retrieved from http://www.oregonlive.com/ducks/index.ssf/2012/08/oregon_ducks_quaterback_marcus.html

Gaidos, S. (2010, August 14). More than a feeling: Emotionally evocative, yes, but music goes much deeper. *Science News,178*(4), 24–29.

Fernald, L. C. H., Gertler, P. J., & Neufeld, L. M. (2008). The importance of cash in conditional cash transfer programs for child health, growth and development: An analysis of Mexico's *Oportunidades*. *Lancet*, *371*(9615), 828–837. doi:10.1016/S0140-6736(08)60382-7

Fernández-Ruiz, J., Sagredo, O., Pazos, M. R., García, C., Pertwee, R., Mechoulam, R., & Martínez-Orgado, J. (2013). Cannabidiol for neurodegenerative disorders: important new clinical applications for this phytocannabinoid? *British Journal of Clinical Pharmacology,75*(2), 323–333.

Festinger, L. (1957). *A theory of cognitive dissonance.* Stanford, CA: Stanford University Press.

Festinger, L., Schachter, S., & Back, K. (1950). *Social pressures in informal groups: A study of a housing community.* New York, NY: Harper & Row.

Field, A. E., Sonneville, K. R., Crosby, R. D., Swanson, S. A., Eddy, K. T., Camargo, C. A., Jr., . . . Micali, N. (2014). Prospective associations of concerns about physique and the development of obesity, binge drinking, and drug use among adolescent boys and young adult men. *JAMA Pediatrics, 168*(1), 34–39.

Field, E. (2007). *Bully blocking: Six secrets to help children deal with teasing and bullying.* Warriewood, Australia: Finch.

Field, T. (1995). Massage therapy for infants and children. *Journal of Developmental and Behavioral Pediatrics, 16*(2).

Field, T., Diego, M., & Hernandez-Reif, M. (2010). Preterm infant massage therapy research: A review. *Infant Behavior & Development*, *33*(2), 115–124. doi:10.1016/j.infbeh.2009.12.004

Field, T., Diego, M., Pelaez, M., Deeds, O., & Delgado, J. (2010). Breakup distress and loss of intimacy in university students. *Psychology, 1,* 173–177.

Fields, H. (2010, May 17). Golden years truly are golden. *Science Now.* Retrieved from http://news.sciencemag.org/sciencenow/2010/05/golden-years-truly-are-golden.html.

Fields, H. L. (1978, November). Secrets of the placebo. *Psychology Today*, 172.

Fields, H. L. (2009, September/October). The psychology of pain. *Scientific American Mind, 21*(5), 43–49.

Fields, H. L., & Levine, J. D. (1984). Placebo analgesia: A role for endorphins. *Trends in Neuroscience, 7,* 271–273.

Fields, R. D. (2004, April). The other half of the brain. *Scientific American, 290*(4), 54–61.

Figley, C. R. (2002). *Treating compassion fatigue.* New York, NY: Brunner-Routledge.

Finckenauer, J. O., Gavin, P. W., Hovland, A., & Storvoll, E. (1999). *Scared straight: The panacea phenomenon revisited.* Prospect Heights, IL: Waveland Press.

Findley, M. J., & Cooper, H. M. (1983). Locus of control and academic achievement: A literature review. *Journal of Personality and Social Psychology, 44,* 419–427.

Finer, B. (1980). Hypnosis and anaesthesia. In G. D. Burrows & L. Donnerstein (Eds.), *Handbook of hypnosis and psychosomatic medicine.* Amsterdam: Elsevier/North Holland Biomedical Press.

Finstad, K., Bink, M., McDaniel, M., & Einstein, G. O. (2006). Breaks and task switches in prospective memory. *Applied Cognitive Psychology, 20,* 705–712. doi: 10.1002/acp.1223

Fiorillo, C. D., Tobler, P. N., & Schultz, W. (2003, March 21). Discrete coding of reward probability and uncertainty by dopamine neurons. *Science, 299,* 1898–1902.

Fiorito, G., & Scotto, P. (1992). Observational learning in Octopus vulgaris. *Science, 256,* 545–547.

Fischer, A. H. (1993). Sex differences in emotionality: Fact or stereotype? *Feminism & Psychology, 3,* 303–318.

Fischer, A. H., Rodriguez Mosquera, P. M., van Vianen, A. E. M., & Manstead, A. S. R. (2004). Gender and culture differences in emotion. *Emotion, 4,* 87–94. [See also: Baumeister et al., 1990; Fischer et al., 1993; Gottman, 1994; Gottman & Krokoff, 1989; Gottman & Levenson, 1986; Oatley & Duncan, 1994; Polefrone & Manuck, 1987; Rusting & Nolen-Hoeksema, 1998; Shaver & Hazan, 1987; Shields, 1991.]

Fischhoff, B. (1975). Hindsight AD foresight: The effect of outcome knowledge on judgment under uncertainty. *Journal of Experimental Psychology: Human Perception and Performance, 1,* 288–299.

Fisher, H. E. (1992). *Anatomy of love: The natural history of monogamy, adultery, and divorce.* New York, NY: W. W. Norton and Company.

Fishman, H. C. (1993). *Intensive structural therapy: Treating families in their social context.* New York, NY: Basic Books.

Fiske, S. T., Cuddy, A. J. C., & Glick, P. (2007). Universal dimensions of social cognition: Warmth and competence. *Trends in Cognitive Science, 11,* 77–83.

Fiske, S. T., & Neuberg, S. L. (1990). A continuum of impression formation, from category-based to individuating processes: Influences of information and motivation on attention and interpretation. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 23). San Diego, CA: Academic Press.

Fitzpatrick, A. L., Kronmal, R. A., Gardner, J. P., Psaty, B. M., Jenny, N. S., Tracy R. P., et al. (2007). Leukocyte telomere length and cardiovascular disease in the Cardiovascular Health Study. *American Journal of Epidemiology, 165*, 14–21.

Flaman, F., & McLaughlin, T. F. (1986). Token reinforcement: Effects for accuracy of math performance and generalization to social behavior with an adolescent student. *A Journal for Remedial Education and Counseling, 2,* 39–47.

Fleeson, W. (2004). Moving personality beyond the person-situation debate: The challenge and the opportunity of within-person variability. *Current Directions in Psychological Science, 13,* 83–87.

Fleischman, J. (2002). *Phineas Gage: A gruesome but true story about brain science.* Boston, MA: Houghton Mifflin.

Fletcher, A., Lamond, N., van den Heuvel, C. J., & Dawson, D. (2003). Prediction of performance during sleep deprivation and alcohol intoxication using a quantitative model of work-related fatigue. *SleepResearch Online, 5,* 67–75. Retrieved from www.sro.org/2003/Fletcher/67/.

Fletcher, G. J. O., & Ward, C. (1988). Attribution theory and processes: A cross-cultural perspective. In M. H. Bond (Ed.), *The cross-cultural challenge to social psychology* (pp. 230–244). Newbury Park, CA: Sage.

Flier, J. S. (2006, May 12). Regulating energy balance: The substrate strikes back. *Science, 312,* 861–864.

Flier, J. S., & Maratos-Flier, E. (2007, September). What fuels fat. *Scientific American, 297*(3), 72–81. [See also: Campfield et al., 1998; Comuzzie & Allison, 1998; Gura, 1998, 2003; Hill & Peters, 1998; Levine et al., 1999; Ravussin & Danforth, 1999.]

Flynn, J. R. (1987). Massive IQ gains in 14 nations: What IQ tests really measure. *Psychological Bulletin, 101,* 171–191.

Flynn, J. R. (2003, June). Movies about intelligence: The limitations of *g. Current Directions in Psychological Science, 12,* 95–99.

Flynn, J. R. (2007, October/November). Solving the IQ puzzle. *Scientific American Mind, 18*(5), 25–31.

Fogel, A. (1991). Movement and communication in human infancy: The social dynamics of development. *Human Movement Science, 11,* 387–423.

Foley, H. J., & Matlin, M. W. (2010). *Sensation and perception* (5th ed.). Boston, MA: Allyn & Bacon.

Foley, V. D. (1979). Family therapy. In R. J. Corsini (Ed.), *Current psychotherapies* (2nd ed., pp. 460–469). Itasca, IL: Peacock.

Folkins, C. H., & Sime, W. (1981). Physical fitness training and mental health. *American Psychologist, 36,* 373–389.

Folkman, S., & Lazarus, R. S. (1980). An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behavior, 21,* 219–239.

Forgas, J. P. (2008). Affect and cognition. *Perspectives on Psychological Science, 3,* 94–101.

Foster, J. B. (2006, November 1). Racial, ethnic variables shape the experience of chronic pain. *Applied Neurology.* Retrieved from http://appneurology.com/showArticle.jhtml?articleId=196604178.

Fouts, R. (1997). *Next of kin: What chimpanzees have taught me about who we are.* New York, NY: William Morrow.

Fox, R. E., DeLeon, P. H., Newman, R., Sammons, M. T., Dunivin, D. L., & Baker, D. C. (2009). Prescriptive authority and psychology: A status report. *American Psychologist, 64,* 257–268.

Francis, D., Diorio, J., Liu, D., & Meaney, M. J. (1999). Non-genomic transmission across generations of maternal behavior and stress responses in the rat. *Science, 286*(5442), 1155–1158. doi:10.1126/science.286.5442.1155

Frankl, V. (1959/2014). *Man's search for meaning.* Boston, MA: Beacon Press.

Frankl, V. (1964/2006). *Man's search for meaning.* Boston, MA: Beacon Press.

Frankl, V. (1967). *Psychotherapy and existentialism.* New York, NY: Simon & Schuster.

Franze, K., Grosche, J., Skatchkov, S. N., Schinkinger, S., Foja, C., Schild, D., . . . Guck, J. (2007). Muller cells are living optical fibers in the vertebrate retina. *Proceedings of the National Academy of Sciences, 104,* 8287–8292.

Franklin, M. S., & Zyphur, M. J. (2005). The role of dreams in the evolution of the human mind. *Evolutionary Psychology, 3,* 59–78.

Fraser, S. (Ed.). (1995). *The bell curve wars: Race, intelligence, and the future of America.* New York, NY: Basic Books.

Fredrickson, B. L., Maynard, K. E., Helms, M. J., Haney, T. L., Siegler, I. C., & Barefoot, J. C. (2000). Hostility predicts magnitude and duration of blood pressure response to anger. *Journal of Behavioral Medicine, 23,* 229–243.

French, J. R. P., Jr., Rodgers, W., & Cobb, S. (1974). Adjustment as person-environment fit. In G. V. Coelho, D. A. Hamburg, & J. E. Adams (Eds.), *Coping and adjustment* (pp. 316–333). New York, NY: Basic Books.

Freud, S. (1900/2015). *The interpretation of dreams.* Mineola, NY: Dover.

Freud, S. (1925). The unconscious. In S. Freud (Ed.), *The collected papers* (Vol. 4)*.* London, England: Hogarth.

Freud, S. (1953). *The interpretation of dreams.* New York, NY: Basic Books. (Original work published 1900.)

Freud, S. (1957). *A general introduction to psychoanalysis*. New York, NY: Permabooks. (J. Riviere, Trans. Original work published 1920 by Horace Liveright.)

Friedman, J. M. (2003, February 7). A war on obesity, not the obese. *Science, 299,* 856–858.

Friedman, M., & Rosenman, R. F. (1974). *Type A behavior and your heart.* New York, NY: Knopf.

Friedman, M., & Ulmer, D. (1984). *Treating Type A behavior—and your heart.* New York, NY: Knopf.

Friend, R., Rafferty, Y., & Bramel, D. (1990). A puzzling misinterpretation of the Asch "conformity" study. *European Journal of Social Psychology, 20,* 29–44.

Frincke, J. L., & Pate, W. E., II. (2004). Y*esterday, today, and tomorrow careers in psychology, 2004: What students need to know*. Retrieved from http://research.apa.org.

Frisby, J. P. (1980). *Seeing: Illusion, brain and mind*. New York, NY: Oxford University Press.

Frith, C. D., & Frith, U. (1999, November 26). Interacting minds—A biological basis. *Science, 286,* 1692–1695.

Frith, U. (1993, June). Autism. *Scientific American, 268,* 108–114.

Frith, U. (1997). Autism. *Scientific American* [Special Issue: *The Mind*], *7*(1), 92–98.

Fromm, E., & Shor, R. E. (Eds.). (1979). *Hypnosis: Developments in research and new perspectives* (2nd ed.). Hawthorne, NY: Aldine.

Fujita, F., Diener, E., & Sandvik, E. (1991). Gender differences in dysphoria and well-being: The case for emotional intensity. *Journal of Personality and Social Psychology, 61,* 427–434.

Funder, D. C. (1983a). The "consistency" controversy and the accuracy of personality judgments. *Journal of Personality, 51,* 346–359.

Funder, D. C. (1983b). Three issues in predicting more of the people: A reply to Mischel & Peake. *Psychological Review, 90,* 283–289.

Funder, D. C., & Ozer, D. J. (1983). Behavior as a function of the situation. *Journal of Personality and Social Psychology, 44,* 107–112.

Furnham, A., Moutafi, J., & Crump, J. (2003). The relationship between the revised NEO-Personality Inventory and the Myers-Briggs Type Indicator. *Social Behavior and Personality*, *31, 577*–584. [See also: McCrae & Costa, 1989; Pittenger, 1993]

Furumoto, L. (1979). Mary Whiton Calkins (1863–1930), fourteenth president of the American Psychological Association. *Journal of the History of the Behavioral Sciences, 15,* 346–356. [Cited in Milar, K. S. (n.d.). An historical view of some early women psychologists and the psychology of women. Archived at the Classics in the History of Psychology site: http://psychclassics.yorku.ca/Special/Women/variability.htm.]

Furumoto, L., & Scarborough, E. (1986). Placing women in the history of psychology: The first American women psychologists. *American Psychologist, 41,* 35–42.

Gadsby, P. (2000, July). Tourist in a taste lab. *Discover, 21,* 70–75.

Gage, F. H. (2003, September). Brain, repair yourself. *Scientific American, 289*(3), 46–53. [See also Barinaga, 2003a; Kempermann & Gage, 1999.]

Gahlinger, P. M. (2004). Club drugs: MDMA, gamma-hydroxybutyrate (GHB), rohypnol, and ketamine. *American Family Physician, 69,* 2619–2626.

Gailliot, M. T., Baumeister, R. F., DeWall, C. N., Maner, J. K., Plant, E. A., Tice, D. M., . . . Schmeichel, B. J. (2007). Self-control relies on glucose as a limited energy source: Willpower is more than a metaphor. *Journal of Personality and Social Psychology, 92,* 325–336.

Gainetdinov, R. R., Wetsel, W. C., Jones, S. R., Levin, E. D., Jaber, M., & Caron, M. G. (1999). Role of serotonin in the paradoxical calming effect of psychostimulants on hyperactivity. *Science, 283,* 397–401. [See also: Barkley, 1998; Wu, 1998]

Galambos, N. L. (1992). Parent–adolescent relations. *Current Directions in Psychological Science, 1,* 146–149.

Galea, S., Vlahov, D., Resnick, H., Ahern, J., Susser, E., Gold, J., . . . Kilpatrick, D. (2003). Trends of probable post-traumatic stress disorder in New York City after the September 11th terrorist attacks. *American Journal of Epidemiology, 158*, 514–524.

Galef, B. G., Jr., & Laland, K. N. (2005). Social learning in animals: Empirical studies and theoretical models. *Bioscience, 55*(6), 489–499.

Gallagher, W. (1994, September). How we become what we are. *The Atlantic Monthly,* 39–55.

Gallo, P. S., & McClintock, C. G. (1965). Cooperative and competitive behavior in mixed-motive games. *Journal of Conflict Resolution, 9,* 68–78.

Gallo, V., & Chittajallu, R. (2001, May 4). Unwrapping glial cells from the synapse: What lies inside? *Science, 292,* 872–873.

Gallup, G. G., Jr., & Frederick, D. A. (2010). The science of sex appeal: an evolutionary perspective. *Review of General Psychology, 14*(3), 240–250.

Gallup, Inc. (2010). *In U.S., 62% exceed ideal weight, 19% at their goal.* Retrieved from www.gallup.com/poll/144941/exceed-ideal-weight-goal.aspx.

Gambrel, P. A., & Cianci, R. (2003). Maslow's hierarch of needs: Does it apply in a collectivist culture? *Journal of Applied Management and Entrepreneurship, 8,* 143–161. Retrieved from www3.tjcu.edu.cn/wangshangketang/lyxgl/yuedu/21.pdf.

Gamer, M. (2009, February/March). Portrait of a lie. *Scientific American Mind, 26*(1), 50–55.

Gami, A. S., Howard, D. E., Olson, E. J., & Somers, V. K. (2005, March 24). Day-night pattern of sudden death in obstructive sleep apnea. *New England Journal of Medicine, 352,* 1206–1214. [See also Dement, 1999; Benson, 2003c.]

Ganchrow, J. R., Steiner, J. E., & Daher, M. (1983). Neonatal facial expressions in response to different qualities and intensities of gustatory stimuli. *Infant Behavior and Development, 6,* 189–200.

Garces, E., Thomas, D., & Currie, J. (2002, September). Longer-term effects of head start. *American Economic Review, 92*(4), 999–1012.

Garcia, J. (1990). Learning without memory. *Journal of Cognitive Neuroscience, 2,* 287–305.

Garcia, J. (1993). Misrepresentations of my criticisms of Skinner. *American Psychologist, 48,* 1158.

Garcia, J., & Koelling, R. A. (1966). The relation of cue to consequence in avoidance learning. *Psychonomic Science, 4,* 123–124.

Gardiner, H. W., Mutter, J. D., & Kosmitzki, C. (1998). *Lives across cultures: Cross-cultural human development.* Boston, MA: Allyn & Bacon.

Gardner, H. (1983). *Frames of mind.* New York, NY: Basic Books.

Gardner, H. (1985). *The mind's new science: A history of the cognitive revolution.* New York, NY: Basic Books.

Gardner, H. (1993). *Creating minds: An anatomy of creativity seen through the lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi.* New York, NY: Basic Books.

Gardner, H. (1999a). *Intelligence reframed.* New York, NY: Basic Books.

Gardner, H. (1999b, February). Who owns intelligence? *The Atlantic Monthly, 283,* 67–76.

Gardner, R. A., & Gardner, B. T. (1969). Teaching language to a chimpanzee. *Science, 165,* 664–672.

Garland, A., & Zigler, E. (1993). Adolescent suicide prevention: Current research and social policy implications. *American Psychologist, 48,* 169–182.

Garnsey, S. M. (1993). Event-related brain potentials in the study of language: An introduction. *Language and Cognitive Processes, 8,* 337–356.

Garry, M., & Gerrie, M. P. (2005). When photographs create false memories. *Current Directions in Psychological Science, 14,* 321–325.

Gavetti, G., & Rivkin, J. S. (2005, April). How strategists really think: Tapping the power of analogy. *Harvard Business Review.*

Gazzaniga, M. S. (1970). *The bisected brain.* New York, NY: Appleton-Century-Crofts.

Gazzaniga, M. S. (1998a). *The mind's past.* Berkeley: University of California Press.

Gazzaniga, M. S. (1998b, July). The split brain revisited. *Scientific American, 279,* 50–55.

Gazzaniga, M. S. (2005). Forty-five years of split-brain research and still going strong. *Nature Reviews Neuroscience, 6,* 653–659.

Gelman, R., & Shatz, M. (1978). Appropriate speech adjustments: The operation of conversational constraints on talk to two-year-olds. In M. Lewis & L. A. Rosenblum (Eds.), *Interaction, conversation, and the development of language* (pp. 27–61). New York, NY: Wiley.

Gelman, S. A., & Wellman, H. M. (1991). Insides and essences: Early understandings of the non-obvious. *Cognition, 38,* 213–244.

Gelstein, S., Yeshurun, Y., Rozenkrantz, L., Shushan, S., Frumin, I., Roth, Y., & Sobel , N. (2011, January 14). Human tears contain a chemosignal. *Science, 331,* 226–231. doi: 10.1126/science.1198331

Gentner, D., & Stevens, A. L. (1983). *Mental models.* Hillsdale, NJ: Erlbaum.

George, M. S. (2003, September). Stimulating the brain. *Scientific American, 289*(3), 67–73. [See also: George et al., 1999; Helmuth, 2001b; Travis, 2000b; Wassermann & Lisanby, 2001.]

George, M. S., Taylor, J. J., & Short, E. B. (2013). The expanding evidence base for rTMS treatment of depression. *Current Opinion in Psychiatry*, *26*(1), 13–18. doi:10.1097/YCO.0b013e32835ab46d

Gernsbacher, M. A., Dawson, M., & Goldsmith, H. H. (2005). Three reasons not to believe in an autism epidemic. *Current Directions in Psychological Science, 14,* 55–58.

Getzels, J. W., & Csikszentmihalyi, M. (1976). *The creative vision.* New York, NY: Wiley.

Giambra, L. M. (2000). Daydreaming characteristics across the life-span: Age differences and seven- to twenty-year longitudinal changes. In R. G. Kunzendorf & B. Wallace (Eds.), *Individual differences in conscious experience* (pp. 147–206). Amsterdam, Netherlands: John Benjamins Publishing Company.

Gibbs, W. W. (2001). Side splitting. *Scientific American, 284,* 24–25.

Gibbs, W. W. (2003, December). The unseen genome: Beyond DNA. *Scientific American, 289*(6), 106–113.

Gibbs, W. W. (2005, June). Obesity: An overblown epidemic. *Scientific American, 292*(6), 70–77.

Gibney, A. (Director). (2006). *The Human Behavior Experiments* [Documentary]. USA: Fearful Symmetry.

Gibson, E. J., & Walk, R. D. (1960, April). The "visual cliff." *Scientific American, 202,* 64–71.

Gieler, U., & Walter, B. (2008, June/July). Scratch this! *Scientific American Mind*, *19*(3), 52–59.

Gilbert, K. R. (1996). "We've had the same loss, why don't we have the same grief?" Loss and differential grief in families. *Death Studies, 20,* 269–283.

Gilbert, R. M. (1992). *Extraordinary relationships: A new way of thinking about human interactions.* New York, NY: Wiley.

Gilbertson, J., Dindia, K., & Allen, M. (1998). Relational continuity, constructional units, and the maintenance of relationships. *Journal of Social and Personal Relationships, 15,* 774–790.

Gilchrist, A. (2006, June/July). Seeing in black & white. *Scientific American Mind, 17*(3), 42–49.

Gilligan, C. (1982). *In a different voice: Psychological theory and women's development.* Cambridge, MA: Harvard University Press.

Gilmore, T. M., Baucom, D. H., Kirby, J. S., Porter, L. S., Atkins, D. C., & Keefe, F. J. (2011). Stress buffering effects of daily spousal support on women's daily emotional and physical experiences in the context of breast cancer concerns. *Health Psychology, 30,* 20–30.

Gini, G., Pozzoli, T., & Hymel, S. (2014). Moral disengagement among children and youth: A meta-analytic review of links to aggressive behavior. *Aggressive Behavior*, *40*(1), 56–68.

Gist, R. & Devilly, G. J. (2002, September 7). Post-trauma debriefing: the road too frequently travelled. *The Lancet, 360,* 741. Retrieved from www.pitt.edu/~kconover/ftp/Lancet-CISM.pdf.

Gittrich, G. (2003, May 27). Trauma aid in limbo: Millions unspent as relative few seek counseling. *New York Daily News,* 8.

Gladwell, M. (2005). *Blink.* New York, NY: Little Brown and Company. [See also: Bechara et al., 1997; Gehring & Willoughby, 2002; Vogel, 1997a.]

Gladwell, M. (2008). *Outliers: The story of success*. New York, NY: Little Brown.

Glanz, J. (1998, April 3). Magnetic brain imaging traces a stairway to memory. *Science, 280,* 37.

Glaser, D. (2003). Child abuse and neglect and the brain: A review. *Journal of Child Psychology and Psychiatry, 41,* 97–116.

Glaser, R. (1990). The reemergence of learning theory within instructional research. *American Psychologist, 45,* 29–39.

Glass, R. M. (2001, March). Electroconvulsive therapy: Time to bring it out of the shadows. *JAMA: Journal of the American Medical Association, 285,* 1346–1348.

Glaze, L. E., & Kaeble, D. (2014). *Correctional populations in the United States, 2013.* Bureau of Justice Statistics, December 19, 2014. Downloaded April 18, 2015 from http://www.bjs.gov/index.cfm?ty=pbdetail&iid=5177

Gleitman, H. (1991). Edward Chace Tolman: A life of scientific and social purpose. In G. A. Kimble, M. Wertheimer, & C. L. White (Eds.), *Portraits of pioneers in psychology* (pp. 226–241). Washington, DC: American Psychological Association. [See also: Kesner & Olton, 1990; Olton, 1992; Tolman, 1932.]

Goel, V., & Dolan, R. J. (2001). The functional anatomy of humor: Segregating cognitive and affective components. *Nature Neuroscience, 4,* 237–238. [See also: Winerman, 2006]

Gold, D. R., Rogacz, S., Bock, N., Tosteson, T. D., Baum, T. M., Speizer, F. E., & Czeisler, C. A. (1992). Rotating shift work, sleep, and accidents related to sleepiness in hospital nurses. *American Journal of Public Health, 82*(7), 1011–1014.

Goldapple, K., Segal, Z., Garson, C., Lau, M., Bieling, P., Kennedy, S., & Mayberg, H. (2004). Modulation of cortical-limbic pathways in major depression: Treatment-specific effects of cognitive behavior therapy. *Archives of General Psychiatry, 61,* 34–41.

Goldberg, C. (2008, March 3). Brain scans support surprising differences in perception between Westerners and Asians. *The Boston Globe,* p. C1.

Golden, C., & Figueroa, M. (2007). Facing cultural challenges in personality testing: A review of *Assessing hispanic clients using the MMPI-2 and MMPI-A.* Retrieved from Psyc-Critiques at http://content.apa.org/critiques/52/41/1.html?sid=7903CA01-0711-4940-886C-9E3D3DB7D4AA.

Golden, O. (2000). The federal response to child abuse and neglect. *American Psychologist, 55,* 1050–1053.

Goldin-Meadow, S., & Mylander, C. (1990). Beyond the input given: The child's role in the acquisition of language. *Language, 66,* 323–355.

Goldstein, N., Martin, S., & Cialdini, R. (2008). *Yes! 59 scientifically proven ways to be persuasive.* New York, NY: Simon & Schuster.

Goldman-Rakic, P. S. (1992, September). Working memory and the mind. *Scientific American, 267,* 110–117.

Goleman, D. (1980, February). 1528 little geniuses and how they grew. *Psychology Today, 14,* 28–53.

Goleman, D. (1995). *Emotional intelligence.* New York, NY: Bantam Books.

Golombok, S., & Tasker, F. (1996). Do parents influence the sexual orientation of their children? Findings from a longitudinal study of lesbian families. *Developmental Psychology, 32,* 3–11. [See also: Bailey et al., 1995; Bell et al., 1981; Isay, 1990]

Gomez, R., & McLaren, S. (2007). The inter-relations of mother and father attachment, self-esteem and aggression during late adolescence. *Aggressive Behavior, 33,* 160–169.

Gonzalvo, P., Cañas, J. J., & Bajo, M. (1994). Structural representations in knowledge acquisition. *Journal of Educational Psychology, 86,* 601–616.

Goodale, M. A., & Milner, A. D. (1992). Separate visual pathways for perception and action. *Trends in Neuroscience, 15,* 20–25.

Goodall, J. (1986). *The chimpanzees of Gombe: Patterns of behavior.* Cambridge, MA: Harvard University Press.

Goodman, G. S., Quas, J. A., & Ogle, C. M. (2010). Child maltreatment and memory. *Annual Review of Psychology, 61,* 325–351.

Goodwyn, S. W., & Acredolo, L. P. (2000). *Baby minds.* New York, NY: Bantum Books.

Gottesman, I. I. (1991). *Schizophrenia genesis: The origins of madness.* New York, NY: Freeman.

Gottesman, I. I. (2001). Psychopathology through a life span–genetic prism. *American Psychologist, 56,* 867–878.

Gottlieb, B. H. (1987). Marshalling social support for medical patients and their families. *Canadian Psychology, 28,* 201–217.

Gottman, J. M. (1994). *What predicts divorce?: The relationship between marital processes and marital outcomes.* Hillsdale, NJ: Lawrence Erlbaum.

Gottman, J. M. (1995). *Why marriages succeed or fail.* New York, NY: Fireside.

Gottman, J. M. (1999). *Seven principles for making marriages work.* New York, NY: Crown.

Gould, E., Tanapat, P., McEwen, B. S., Fluge, G., & Fuchs, E. (1998). Proliferation of granule cell precursors in the dentate gyrus of adult monkeys is diminished by stress. *Proceedings of the National Academy of Science, 99,* 3168–3171.

Gould, S. J. (1996). *The mismeasure of man* (2nd ed.). New York: Norton.

Grabe, S., Hyde, J., & Lindberg, S. (2007). Body objectification and depression in adolescents: The role of gender, shame, and rumination. *Psychology of Women Quarterly, 31,* 164–175.

Grace, A. A. (2010). Ventral hippocampus, inter-neurons, and schizophrenia: A new understanding of the pathophysiology of schizophrenia and its implications for treatment and prevention. *Current Directions in Psychological Science, 19,* 232–237.

Graham, J. R. (1990). *MMPI-2: Assessing personality and psychopathology.* New York, NY: Oxford University Press.

Grant, A. M., & Shin, J. (2011). Work motivation: Directing, energizing, and maintaining effort (and research). Later published in R. M. Ryan (Ed.), *Oxford handbook of human motivation.* (2014). Oxford, England: Oxford University Press. Retrieved from https://mgmt.wharton.upenn.edu/files/?whdmsaction=public:main.file&fileID=4197

Grant, B. F., & Dawson, D. A. (2006). Introduction to the national epidemiologic survey on alcohol and related conditions. *National Epidemiologic Survey on Alcohol and Related Conditions: Selected Findings.* [Special issue: *Alcohol Research & Health*], *29,* 74–78.

Gray, C. R., & Gummerman, K. (1975). The enigmatic eidetic image: A critical examination of methods, data, and theories. *Psychological Bulletin, 82,* 383–407.

Gray, J. R. (2004). Integration of emotion and cognitive control. *Current Directions in Psychological Science, 13,* 46–48.

Graziano, M. S. A., Cooke, D. F., & Taylor, C. S. R. (2000, December 1). Coding the location of the arm by sight. *Science, 290,* 1782–1786.

Greeley, A., & Sheatsley, P. (1971). The acceptance of desegregation continues to advance. *Scientific American, 225*(6), 13–19.

Green, C. S., & Bavelier, D. (2007). Action-video-game experience alters the spatial resolution of vision. *Psychological Science, 18,* 88–94.

Green, D. M., & Swets, J. A. (1966). *Signal detection theory and psychophysics.* New York, NY: Wiley.

Greenberg, B. S. (1986). Minorities and the mass media. In J. Bryant & D. Zillman (Eds.), *Perspectives in media effects* (pp. 17–40). Hillsdale, NJ: Erlbaum.

Greenberg, G. (1997). Right answers, wrong reasons: Revisiting the deletion of homosexuality from the *DSM. Review of General Psychology, 1,* 256–270.

Greene, R. L. (1991). *The MMPI-2/MMPI: An interpretive manual.* Boston, MA: Allyn & Bacon.

Greenhoot, A. F., Bunnell, S. L., Curtis, J. S., & Beyer, A. M. (2008). Trauma and autobiographical memory function: Findings from a longitudinal study of family violence. In M. L. Howe, G. S. Goodman, & D. Cichetti (Eds.), *Stress, trauma, and children's memory development.* New York, NY: Oxford University Press.

Greenwald, A. G. (1992). New look 3: Unconscious cognition reclaimed. *American Psychologist, 47*(6), 766–779.

Greenwald, A. G., Draine, S. C., & Abrams, R. L. (1996, September 20). Three cognitive markers of unconscious semantic activation. *Science, 273,* 1699–1702.

Greer, M. (2004a, September). People don't notice unexpected visual changes—though they predict they will. *Monitor on Psychology, 35*(8), 10.

Greer, M. (2004b, July/August). Strengthen your brain by resting it. *Monitor on Psychology, 35*(7), 60–62. [See also: Maquet, 2001; Siegel, 2001; Stickgold et al., 2001.]

Greer, M. (2005, March). When intuition misfires. *Monitor on Psychology, 36*(3), 58–60.

Gregoire, C. (2015, March 31). Study reveals sad link between poverty and children's brain development. *The Huffington Post.*

Gregory, R. (1997). *Mirrors in mind.* New York, NY: W. H. Freeman.

Gregory, R. L. (1977). *Eye and brain: The psychology of seeing* (3rd ed.). New York, NY: World University Library.

Grevert, P., & Goldstein, A. (1985). Placebo analgesia, naloxone, and the role of en dogenous opioids. In L. White, B. Turks, & G. E. Schwartz (Eds.), *Placebo* (pp. 332–351). New York, NY: Guilford. [See also: Mayer, 1979; Watkins & Mayer, 1982.]

Grimm, O. (2007, April/May). Addicted to food? *Scientific American Mind, 18*(2), 36–39. [See also: Gura, 2000; Woods et al., 1998.]

Griner, D., & Smith, T. B. (2006). Culturally adapted mental health intervention: A meta-analytic review. *Psychotherapy: Theory, Research, Practice, Training, 43,* 531–548.

Grinspoon, L., Bakalar, J. B., Zimmer, L., & Morgan, J. P. (1997, August 8). Marijuana addiction. *Science, 752,* 748.

Groeger, L. (2012, February 28). Making sense of the world, several senses at a time: Sensory cross talk helps us navigate the world. *Scientific American* (online-only article). Retrieved from http://www.scientificamerican.com/article/making-sense-world-sveral-senses-at-time/

Gross, A. E., & Psaki, J. (2004, June 25). *Venting: Its role in mediation.* Annual Conference, Association for Conflict Resolution of Greater New York, Columbia Law School.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2,* 271–299.

Grossman, C. L. (2011, March 15). Japanese look to ancient traditions for strength. *USA Today.*

Grossmann, K., Grossmann, K. E., Spangler, S., Suess, G., & Unzner, L. (1985). Maternal sensitivity and newborn attachment orientation responses as related to quality of attachment in northern Germany. In I. Bretherton & E. Waters (Eds.), *Growing points of attachment theory: Monographs of the society of research in child development, 50* (1–2, Serial No. 209).

Gruben, D., & Madsen, L. (2005, June). Lie detection and the polygraph: A historical review. *Journal of Forensic Psychiatry & Psychology, 16,* 357–369.

Guisinger, S. (2003). Adapted to flee famine: Adding an evolutionary perspective on anorexia nervosa. *Psychological Review, 110,* 745–761.

Guisinger, S., & Blatt, S. J. (1994). Individuality and relatedness: Evolution of a fundamental dialectic. *American Psychologist, 49,* 104–111.

Gur, R. E., & Maany, V. (1998). Subcortical MRI volumes in neuroleptic-naive and treated patients with schizophrenia. *American Journal of Psychiatry, 155,* 1711–1718.

Guterman, L. (2005, December 2). Duping the brain into healing the body. *The Chronicle of Higher Education,* A12–A14.

Guthrie, R. V. (1998). *Even the rat was white.* Boston, MA: Allyn & Bacon.

Gutman, A. R. (2006, January 5). Deep brain stimulation for treatment-resistant depression: An expert interview with Helen S. Mayberg, MD. Retrieved from www.Medscape.com/viewarticle/520659.

Guyll, M., & Contrada, R. J. (1998). Trait hostility and ambulatory cardiovascular activity: Responses to social interaction. *Health Psychology, 17,* 30–39.

Haber, R. N. (1969, April). Eidetic images. *Scientific American, 220,* 36–44.

Haber, R. N. (1970, May). How we remember what we see. *Scientific American, 222,* 104–112.

Haber, R. N. (1980, November). Eidetic images are not just imaginary. *Psychology Today, 14,* 72–82.

Haberlandt, K. (1999). *Human memory: Exploration and application.* Boston, MA: Allyn & Bacon.

Hagen, E. (2004). The evolutionary psychology FAQ. On *Buss Lab: Evolutionary psychology at the University of Texas.* Retrieved from www.anth.ucsb.edu/projects/human/evpsychfaq.html.

Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review, 108,* 814–834.

Haidt, J. (2007). The new synthesis in moral psychology. *Science, 316,* 998–1002.

Haier, R. J., Jung, R. E., Yeo, R. A., Head, K., & Alkire, M. T. (2004). Structural brain variation and general intelligence. *Neuroimage, 23,* 425–433.

Haimov, I., & Lavie, P. (1996). Melatonin—A soporific hormone. *Current Directions in Psychological Science, 5,* 106–111.

Halberstam, D. (2002). *Firehouse.* New York, NY: Hyperion.

Hall, C. (1951). What people dream about. *Scientific American, 184,* 60–63.

Hall, C. (1953/1966). *The meaning of dreams.* New York, NY: Harper & Row/McGraw-Hill.

Hall, C. S. (1984). "A ubiquitous sex difference in dreams" revisited. *Journal of Personality and Social Psychology, 46,* 1109–1117.

Hall, M. J., Norwood, A. E., Ursano, R. J., Fullerton, C. S., & Levinson, C. J. (2002). Psychological and behavioral impacts of bioterrorism. *PTSD Research Quarterly, 13,* 1–2.

Halpern, D. F. (2002). *Thought & knowledge: An introduction to critical thinking.* Mahwah, NJ: Erlbaum.

Halpern, D. F. (2008). Nurturing careers in psychology: Combining work and family. *Educational Psychology Review, 20*(1), 57–64.

Hamann, S. (2005). Sex differences in the responses of the human amygdale. *Neuroscientist, 11,* 288–293.

Hamann, S. B., Ely, T. D., Hoffman, J. M., & Clinton, D. K. (2002). Ecstasy and agony: Activation of the human amygdala in positive and negative emotion. *Psychological Science, 13,* 135–141.

Hambrick, D. Z. (2014, December 2). Brain training doesn't make you smarter: Scientists doubt claims from brain training companies. *Scientific American*. Retrieved from http://www.scientificamerican.com/article/brain-training-doesn-t-make-you-smarter/

Hamlin, K., Wynn, K., & Bloom, P. (2007). Social evaluation by preverbal infants. *Nature, 450,* 557–559.

Haney, C., Banks, W. C., & Zimbardo, P. G. (1973). Interpersonal dynamics in a simulated prison. *International Journal of Criminology and Penology, 1,* 69–97.

Haney, C., & Zimbardo, P. (1998). The past and future of U.S. prison policy: Twenty-five years after the Stanford prison experiment. *American Psychologist, 53,* 709–727.

Harder, B. (2004, June 19). Narcolepsy science reawakens. *Science News, 165,* 394–396.

Harder, B. (2005, November 26). Staring into the dark: Research investigates insomnia drugs. *Science News, 168,* 344–345.

Harder, B. (2006, April 1). XXL from too few Zs? *Science News, 169,* 195–196.

Hariri, A. R., Mattay, V. S., Tessitore, A., Kolachana, B., Fera, F., Goldman, D., Egan, M. F., & Weinberger, D. R. (2002, July 19). Serotonin transporter genetic variation and the response of the human amygdala. *Science, 297,* 400–403.

Harlow, H. F. (1965). Sexual behavior in the rhesus monkey. In F. Beach (Ed.), *Sex and behavior.* New York, NY: Wiley.

Harlow, H. F., & Harlow, M. K. (1966). Learning to love. *American Scientist, 54,* 244–272.

Harmer, C. J., O'Sullivan, U., Favaron, E., Massey-Chase, R., Ayres, R., Reinecke, A., . . . Cowen, P. J. (2009, October). Effect of acute antidepressant administration on negative affective bias in depressed patients. *American Journal of Psychiatry,166*(10), 1178–1184. http://dx.doi.org/10.1176/appi.ajp.2009.09020149

Harmer, C. J., Pariante, C. M. (2012, July 18). *How antidepressants work*. British Association for Psychopharmacology. Retrieved from http://www.bap.org.uk/publicinformation-item.php?publicinfoID=14

Harmon-Jones, E., & Winkielman, P. (2007). *Social neuroscience: Integrating biological and psychological explanations of social behavior*. New York, NY: Guilford Press.

Harris, B. (1979). Whatever happened to Little Albert? *American Psychologist, 34,* 151–160.

Harris, B. (2011). Letting go of little Albert: Disciplinary memory, history, and the uses of myth. *Journal of the History of the Behavioral Sciences. 47*(1), 1–17.

Harris, G., Thomas, A., & Booth, D. A. (1990). Development of salt taste in infancy. *Developmental Psychology, 26,* 534–538.

Harris, J. A. (2004). Measured intelligence, achievement, openness to experience, and creativity. *Personality & Individual Differences, 36,* 913–929.

Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological Review, 102,* 458–489.

Harris, M. J., & Rosenthal, R. (1986). Four factors in the mediation of teacher expectancy effects. In R. S. Feldman (ed.), *The social psychology of education: Current research and theory.* New York, NY: Cambridge University Press.

Hartman, P. S. (2000). *Women developing wisdom: Antecedents and correlates in a longitudinal sample.* Unpublished doctoral dissertation, University of Michigan, Ann Arbor.

Hartmann, E. L. (1973). *The functions of sleep.* New Haven, CT: Yale University Press.

Harvey, A. G. (2008). Insomnia, psychiatric disorders, and the transdiagnostic perspective. *Current Directions in Psychological Science, 17,* 299–303.

Harvey, J. H. (1996). *Embracing their memory: Loss and the social psychology of storytelling.* Boston, MA: Allyn & Bacon.

Harvey, J. H., & Hofmann, W. J. (2001). Teaching about loss. *Journal of Loss and Trauma, 6,* 263–268.

Harvey, J. H., & Pauwels, B. G. (1999). Recent developments in close-relationships theory. *Current Directions in Psychological Science, 8,* 93–95.

Harvey, J. H., Weber, A. L., & Orbuch, T. L. (1990). *Interpersonal accounts: A social psychological perspective.* Cambridge, MA: Basil Blackwell.

Harvey, S. M., & Spigner, C. (1995). Factors associated with sexual behavior among adolescents: A multivariate analysis. *Adolescence, 30,* 253–264.

Hasin, D. S., Goodwin, R. D., Stinson, F. S., & Grant, B. F. (2005, October). Epidemiology of major depressive disorder: Results from the National Epidemiologic Survey on Alcoholism and Related Conditions. *Archives of General Psychiatry, 62,* 1097–1106. Retrieved from http://archpsyc.amaassn.org/cgi/reprint/62/10/1097.

Haslam, S. A. (2007, April/May). I think, therefore I err? *Scientific American Mind, 18*(2), 16–17.

Haslam, S. A., Miller, A. G., & Reicher, S.D., Eds. (2014). Milgram at 50: Exploring the enduring relevance of psychology's most famous studies. *Journal of Social Issues, 70*(3).

Haslam, S. A., Salvatore, J., Kessler, T., & Reicher, S. D. (2008, April/May). The social psychology of success. *Scientific American Mind, 19,* 24–31.

Hasler, G., Buysse, D. J., Klaghofer, R., Gamma, A., Ajdacic, V., Eich, D., . . . Angst, J. (2004). The association between short sleep duration and obesity in young adults: A 13-year prospective study. *Sleep, 27,* 661–666.

Hassan. S. (1988/2015). *Combatting cult mind control*. USA: Bear & Co.

Hassebrauck, M. (1988). Beauty is more than "name" deep: The effect of women's first names on ratings of physical attractiveness and personality attributes. *Journal of Applied Social Psychology, 18,* 721–726. [See also: Brigham, 1980; Cash & Duncan, 1984; Moore et al., 1987.]

Hatfield, E., & Rapson, R. (1993). *Love, sex, and intimacy: Their psychology, biology, and history.* New York, NY: HarperCollins.

Hatfield, E., & Rapson, R. (1998). On love and sex in the 21st century. *The General Psychologist, 33*(2), 45–54.

Hatfield, E., Rapson, R. L., & Rapson, R. (1995). *Love and sex: Cross-cultural perspectives.* Boston, MA: Allyn & Bacon.

Hatfield, E., & Sprecher, S. (1986). *Mirror, mirror: The importance of looks in everyday life.* New York: State University of New York Press.

Hatzfeld, J. (2005). *Machete season: The killers in Rwanda speak.* New York, NY: Farrar, Strauss, and Giroux.

Haun, D. B. M., Rekers, Y., & Tomasello, M. (2014). Children conform to the behavior of peers; other great apes stick with what they know. *Psychological Science, 25*(12), 2160–2167. doi: 10.1177/0956797614553235

Hauser, M. D., Chomsky, N., & Fitch, W. T. (2002, November 22). The faculty of language: What is it, who has it, and how did it evolve? *Science, 298,* 1569–1579.

Hawkins, S. A., & Hastie, R. (1990). Hindsight: Biased judgments of past events after the outcomes are known. *Psychological Bulletin, 108,* 311–327.

Haworth, C. M., Wright, M. J., Luciano, M., Martin, N. G., de Geus, E. J., van Beijsterveldt, C. E., . . . Plomin, R. (2010). The heritability of general cognitive ability increases linearly from childhood to young adulthood. *Molecular Psychiatry, 15,* 1112–1120.

Hazan, C., & Diamond, L. M. (2000). The place of attachment in human mating. *Review of General Psychology, 4,* 186–204.

Hazan, C., & Shaver, P. R. (1990). Love and work: An attachment-theoretical perspective. *Journal of Personality and Social Psychology, 59,* 270–280.

Hazeltine, E., & Ivry, R. B. (2002, June 14). Can we teach the cerebellum new tricks? *Science, 296,* 1979–1980. [See also Raymond, Lisberger, & Mauk, 1996; Seidler et al., 2002.]

He, X. Z., & Baker, D. W. (2004). Body mass index, physical activity, and the risk of decline in overall health and physical functioning in late middle age. *American Journal of Public Health, 94,* 1567–1573.

Headey, B., & Wearing, A. (1992). *Understanding happiness: A theory of well-being.* Melbourne, Australia: Longman Cheshire.

Health Development Agency. (2004, June). *The effectiveness of public health campaigns.* Retrieved from http://www.nice.org.uk/niceMedia/documents/CHB7-campaigns-14-7.pdf

Heatherton, T. F., Macrae, C. N., & Kelley, W. M. (2004). What the social brain sciences can tell us about the self. *Current Directions in Psychological Science, 13,* 190–193.

Hébert, R. (2005, January). The weight is over. *APS Observer, 18*(1), 20–24.

Hébert, R. (2006, October). We love to be scared on Halloween but fears and phobias are no laughing matter. *APS Observer, 19*(10), 14–19.

Hecht, A. (1986, April). A guide to the proper use of tranquilizers. *Healthline Newsletter,* 5–6.

Heckler, S. (1994). Facilitated communication: A response by child protection. *Child Abuse and Neglect: The International Journal, 18*(6), 495–503.

Hedden, T., Ketay, S., Aron, A., Markus, H. R., & Gabrieli, J. D. E. (2008.) Cultural influences on neural substrates of attentional control. *Psychological Science, 19,* 12–17. doi: 10.1111/j.1467-9280.2008.02038.x.

Heine, S. J., Lehman, D. R., Markus, H. R., & Kitayama, S. (1999). Is there a universal need for positive self-regard? *Psychological Review, 106,* 766–794.

Heinrichs, R. W. (1993). Schizophrenia and the brain: Conditions for a neuropsychology of madness. *American Psychologist, 48,* 221–233.

Helmes, E., & Reddon, J. R. (1993). A perspective on developments in assessing psychopathology: A critical review of the MMPI and MMPI-2. *Psychological Bulletin, 113,* 453–471. [See also: Butcher et al., 1989; Butcher & Williams, 1992; Greene, 1991.]

Helms, J. E. (1992). Why is there no study of cultural equivalence in standardized cognitive ability testing? *American Psychologist, 47,* 1083–1101. [See also: Garcia, 1981; Miller-Jones, 1989]

Helmuth, L. (2000, December 1). Where the brain monitors the body. *Science, 290,* 1668.

Helmuth, L. (2001a, November 2). Beyond the pleasure principle. *Science, 294,* 983–984.

Helmuth, L. (2001b, March 16). Dyslexia: Same brains, different languages. *Science, 291,* 2064–2065.

Helmuth, L. (2002, June 21). A generation gap in brain activity. *Science, 296,* 2131–2133.

Helmuth, L. (2003a, November 14). Brain model puts most sophisticated regions front and center. *Science, 302,* 1133.

Helmuth, L. (2003b, April 25). Fear and trembling in the amygdala. *Science, 300,* 568–569. [See also: Bechara et al., 1995; Johnson, 2003]

Helmuth, L. (2003c, February 28). The wisdom of the wizened. *Science, 299,* 1300–1302.

Hendrick, S. S., & Hendrick, C. (1992). *Liking, loving, and relating* (2nd ed.) Pacific Grove, CA: Brooks/Cole.

Henker, B., & Whalen, C. K. (1989). Hyperactivity and attention deficits. *American Psychologist, 44,* 216–223.

Hepworth, K. (2010). Eating disorders today—not just a girl thing. *Journal of Christian Nursing, 27*(3), 236–241.

Herek, G. M. (2000). The psychology of sexual prejudice. *Current Directions in Psychological Science, 9,* 19–22.

Herek, G., Norton, A., Allen, T., & Sims, C. (2010). Demographic, psychological, and social characteristics of self-identified lesbian, gay, and bisexual adults in a U.S. probability sample. *Sexuality Research and Social Policy, 7,* 176–200.

Herrnstein, R. J., & Murray, C. (1994). *The bell curve.* New York, NY: Free Press.

Hersen, M., & Thomas, J. C. (2005). *Comprehensive handbook of personality and psychopathology* (Vol. 2). Hoboken, NJ: Wiley and Sons.

Hersh, S. M. (2004a, May 5). American soldiers brutalize Iraqis: How far up does the responsibility go? Torture at Abu Ghraib. *The New Yorker.*

Hersh, S. M. (2004b). *Chain of command: The road from 9/11 to Abu Ghraib.* New York, NY: HarperCollins.

Hetherington, E. M., & Parke, R. D. (1975). *Child psychology: A contemporary viewpoint.* New York, NY: McGraw-Hill.

Hettema, J. M., Neale, M. C., & Kendler, K. S. (2001). A review and meta-analysis of the genetic epidemiology of anxiety disorders. *American Journal of Psychiatry, 158,* 1568–1578.

Heyman, K. (2006, May 5). The map in the brain: Grid cells may help us navigate. *Science, 312,* 680–681.

Hibbard, S. (2003). A critique of Lilienfeld et al.'s (2000) "The scientific status of projective techniques." *Journal of Personality Assessment, 80,* 260–271. [See also: Exner, 1974, 1978; Exner & Weiner, 1982]

Hickok, G. (2009). Eight problems for the mirror neuron theory of action understanding in monkeys and humans. *Journal of Cognitive Neuroscience, 21,* 1229–1243.

Hickok, G. (2010, March 26). *Self-destruction of mirror neurons. Talking brains blog.* Retrieved from www.talkingbrains.org/2010/03/self-destruction-of-mirror-neuron.html

Hickok, G. M. (2014). *The myth of mirror neurons: The real neuroscience of communication and cognition.* New York, NY: W. W. Norton.

Hicks, R. A. (1990). *The costs and benefits of normal insomnia.* Paper presented to the annual meeting of the Western Psychological Association, Los Angeles, CA.

Higgins, J. W., Williams, R. L., & McLaughlin, T. F. (2001). The effects of a token economy employing instructional consequences for a third-grade students with learning disabilities: A data-based case study. *Education and Treatment of Children, 24,* 99–106. [See also: Corrigan, 1995; Le Blanc et al., 2000; Morisse et al., 1996.]

Hilgard, E. R. (1992). Dissociation and theories of hypnosis. In E. Fromm & M. R. Nash (Eds.), *Contemporary hypnosis research.* New York, NY: Guilford.

Hill, J. O., & Peters, J. C. (1998, May 29). Environmental contributions to the obesity epidemic. *Science, 280,* 1371–1374.

Hilts, P. J. (1995). *Memory's ghost: The strange tale of Mr. M. and the nature of memory.* New York, NY: Simon & Schuster.

Hiroto, D. S. (1974). Locus of control and learned helplessness. *Journal of Experimental Psychology, 102,* 187–193.

Hirschfeld, L. A. (1996). *Race in the making: Cognition, culture, and the child's construction of human kinds.* Cambridge, MA: MIT Press.

Hobson, J. A. (1988). *The dreaming brain.* New York, NY: Basic Books.

Hobson, J. A. (2002). *Dreaming: An introduction to the science of sleep.* New York, NY: Oxford University Press.

Hobson, J. A. (2009, November). REM sleep and dreaming: Towards a theory of protoconsciousness. *Nature Reviews Neuroscience, 10,* 803–813.

Hobson, J. A., & McCarley, R. W. (1977). The brain as a dream state generator: An activation-synthesis hypothesis of the dream process. *American Journal of Psychiatry, 134,* 1335–1348.

Hochberg, L. R., Serruya, M. D., Friehs, G. M., Mukand, J. A., Saleh, M., & Caplan, A. H. (2006). Neuronal ensemble control of prosthetic devices by a human with tetraplegia. *Nature, 442,* 164–171. [See also Nicolelis & Chapin, 2002; Taylor, Helms Tillery, & Schwartz, 2002; Wickelgren, 2003.]

Hochwalder, J. (1995). On stability of the structure of implicit personality theory over situations. *Scandinavian Journal of Psychology, 36,* 386–398.

Hoff, E. (2013). Interpreting the early language trajectories of children from low SES and language minority homes: Implications for closing achievement gaps. *Developmental Psychology*, *49*(1), 4–14. doi:10.1037/a0027238

Hoffman, H. G. (2004, August). Virtual-reality therapy. *Scientific American, 291*, 58–65.

Hoffmann, S., Schwarz, U., Dalicho, L., & Hutter, K. (2014). Humor in cross-cultural advertising: A content analysis and test of effectiveness in German and Spanish print advertisements. *Procedia—Social and Behavioral Sciences, 148*(25), 94–101.

Hofling, C. K., Brotzman, E., Dalrymple, S., Graves, N., & Pierce, C. M. (1966). An experimental study in nurse-physician relationships. *Journal of Nervous and Mental Disease, 143,* 171–180.

Hogan, R., Hogan, J., & Roberts, B. W. (1996). Personality measurement and employment decisions: Questions and answers. *American Psychologist, 51,* 469–477.

Hogarty, G. E., Kornblith, S. J., Greenwald, D., DiBarry, A. L., Cooley, S., Ulrich, R. F., . . . Flesher, S. (1997). Three-year trials of personal therapy among schizophrenic patients living with or independent of family, I: Description of study and effects on relapse rates. *American Journal of Psychiatry, 154,* 1504–1513.

Holden, C. (1978). Patuxent: Controversial prison clings to belief in rehabilitation. *Science, 199,* 665–668.

Holden, C. (1980a). Identical twins reared apart. *Science, 207,* 1323–1325.

Holden, C. (1980b, November). Twins reunited. *Science, 80,* 55–59.

Holden, C. (1997, October 3). A special place for faces in the brain. *Science, 278,* 41.

Holden, C. (2000, April 7). Global survey examines impact of depression. *Science, 288,* 39–40.

Holden, C. (2001b, February 9). Panel seeks truth in lie detector debate. *Science, 291,* 967.

Holden, C. (2003, January 17). Deconstructing schizophrenia. *Science, 299,* 333–335. [See also: Lencer et al., 2000; Plomin et al., 1994]

Holden, C. (2004, October 29). Mystics and synesthesia. *Science, 306,* 808.

Holden, C. (2005, June 10). Sex and the suffering brain. *Science, 308,* 1574–1577. [See also: Leutwyler, 1995; Strickland, 1992; Weissman et al., 1996.]

Holden, C. (2008, July 11). Poles apart. *Science, 321,* 193–195.

Hollander, E. M. (2004). Am I all right? *Journal of Loss and Trauma, 9,* 201–204.

Hollon, S. D. (1996). The efficacy and effectiveness of psychotherapy relative to medications. *American Psychologist, 51,* 1025–1030.

Hollon, S. D., Thase, M. E., & Markowitz, J. C. (2002, November). Treatment and prevention of depression. *Psychological Science in the Public Interest, 3,* 39–77.

Holloway, J. D. (2003, December). Snapshot from the therapy room. *Monitor on Psychology, 34*(11), 31.

Holloway, M. (1999, November). The ascent of scent. *Scientific American, 281,* 42, 44.

Holloway, M. (2003, September). The mutable brain. *Scientific American, 289*(3), 78–85.

Holmes, D. S. (2001). *Abnormal psychology* (4th ed.). Boston, MA: Allyn & Bacon. [See also: Linsheid et al., 1990; Lovaas, 1977; Lovaas et al., 1974.]

Holmes, T. H. (1979). Development and application of a quantitative measure of life change magnitude. In J. E. Barrett, R. M. Rose, & G. L. Klerman (Eds.), *Stress and mental disorder.* New York, NY: Raven.

Holmes, T. H., & Masuda, M. (1974). Life change and stress susceptibility. In B. S. Dohrenwend & B. P. Dohrenwend (Eds.), *Stressful life events: Their nature and effects* (pp. 45–72). New York, NY: Wiley.

Holmes, T. H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of Psychosomatic Research, 11*(2), 213–218.

Holstege, G., Georgiandis, J. R., Paans, A. M. J., Meiners, L. C., van der Graff, F. H. C. E., & Reinders, A. A. T. S. (2003). Brain activation during human male ejaculation. *Journal of Neuroscience, 23,* 9185–9193.

Holtzman, W. H. (1992). Health psychology. In M. A. Rosenzweig (Ed.), *International psychological science* (pp. 199–226). Washington, DC: American Psychological Association.

Holtzworth-Munroe, A., & Jacobson, N. S. (1985). Causal attributions of marital couples: When do they search for causes? What do they conclude when they do? *Journal of Personality and Social Psychology, 48,* 1398–1412.

Hölzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S. W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research, 191*(1), 36–43.

Homme, L. E., de Baca, P. C., Devine, J. V., Steinhorst, R., & Rickert, E. J. (1963). Use of the Premack principle in controlling the behavior of nursery school children. *Journal of the Experimental Analysis of Behavior, 6,* 544.

Horgan, J. (1993, June). Eugenics revisited. *Scientific American, 268,* 122–131.

Horgan, J. (1996, November). Multicultural studies: Rates of depression vary widely throughout the world. *Scientific American, 275*(6), 24–25.

Horne, J. A. (1988). *Why we sleep: The functions of sleep in humans and other animals.* Oxford: Oxford University Press.

Horney, K. (1939). *New ways in psychoanalysis.* New York, NY: Norton.

Horney, K. (1942). *Self-analysis.* New York, NY: Norton.

Horney, K. (1967). *Feminine psychology.* New York, NY: Norton.

Horowitz, M. J. (1997). *Stress response syndromes: PTSD, grief, and adjustment disorders* (3rd ed.). Northvale, NJ: Jason Aronson.

Horvath, A. O., & Luborsky, L. (1993). The role of the therapeutic alliance in psychotherapy. *Journal of Consulting and Clinical Psychology, 61,* 561–573.

Hoshino-Browne, E. (2012). Cultural variations in motivation for cognitive consistency: Influences of self-systems on cognitive dissonance. *Social and Personality Psychology Compass, 6*(2), 126–141.

Hosoda, M., Stone-Romero, E. F., & Coats, G. (2003). The effects of physical attractiveness on job-related outcomes: A meta-analysis of experimental studies. *Personnel Psychology, 56*(2), 431–462.

House, J. S., Landis, K. R., & Umberson, D. (1988). Social relationships and health. *Science, 241,* 540–545.

Howes, C., Rodning, C., Galluzzo, D. C., & Myers, L. (1988). Attachment and child care: Relationships with mother and care-giver. *Early Childhood Research Quarterly, 3,* 403–416.

Hu, F. B., Li, T. Y., Colditz, G. A., Willett, W. C., & Manson, J. E. (2003, April 9). Television watching and other sedentary behaviors in relation to risk of obesity and Type 2 diabetes mellitus in women. *Journal of the American Medical Association, 289,* 1785–1791.

Huesmann, L. R., & Moise, J. (1996, June). Media violence: A demonstrated public health threat to children. *Harvard Mental Health Letter, 12*(12), 5–7.

Huesmann, L. R., Moise-Titus, J., Podolski, C-L., & Eron, L. D. (2003). Longitudinal relations between children's exposure to TV violence and their aggressive and violent behavior in young adulthood: 1977–1992. *Developmental Psychology, 39,* 201–221. [See also: Bushman & Anderson, 2001; Johnson et al., 2001.]

Hull, C. L. (1943). *Principles of behavior: An intro duction to behavior theory.* New York, NY: Appleton-Century-Crofts.

Hull, C. L. (1952). *A behavior system: An introduction to behavior theory concerning the individual organism.* New Haven, CT: Yale University Press.

Humphreys, L. G. (1988). Trends in levels of academic achievement of blacks and other minorities. *Intelligence, 12,* 231–260.

Hunt, E. (1989). Cognitive science: Definition, status, and questions. *Annual Review of Psychology, 40,* 603–629. [See also: Medin, 1989; Mervis & Rosch, 1981; Rosch & Mervis, 1975.]

Hunter, I. (1964). *Memory.* Baltimore, MD: Penguin.

Hunter, S. (2012). *Coming out and disclosures: LGBT persons across the life span.* Routledge.

Huss, M. T. (2001). Psychology and law, now and in the next century: The promise of an emerging area of psychology. In J. S. Halonen & S. F. Davis (Eds.), *The many faces of psychological research in the 21st century.* Retrieved from http://teachpsych.org/resources/e-books/faces/script/Ch11.htm.

Huston, T. L., Ruggiero, M., Conner, R., & Geis, G. (1981). Bystander intervention into crime: A Study based on naturally-occurring episodes. *Social Psychology Quarterly, 44,* 14–23.

Huttenlocher, J., Haight, W., Bryk, A., Seltzer, M., & Lyons, T. (1991). Early vocabulary growth: Relation to language input and gender. *Developmental Psychology, 27,* 236–248.

Hyde, J. S. (2007). New directions in the study of gender similarities and differences. *Current Directions in Psychological Science, 16,* 259–263.

Hyde, J. S., & Jaffe, S. (2000). Becoming a heterosexual adult: The experiences of young women. *Journal of Social Issues, 56,* 283–296.

Hyman, I. E. Jr., Husband, T. H., & Billings, F. J. (1995). False memories of childhood experiences. *Applied Cognitive Psychology, 9,* 181–197.

Hyman, I. A. (1996). Using research to change public policy: Reflections on 20 years of effort to eliminate corporal punishment in schools. *Pediatrics, 98,* 818–821. [See also: Hyman et al., 1977.]

Hyman, R. (1989). The psychology of deception. *Annual Review of Psychology, 40,* 133–154.

Iacono, W. G., & Grove, W. M. (1993). Schizophrenia reviewed: Toward an integrative genetic model. *Science, 4,* 273–276.

Ikeda, A., Schwartz, J., Peters, J. L., Baccarelli, A. A., Hoxha, M., Dioni, L., . . . Kubzansky, L. D. (2014). Pessimistic orientation in relation to telomere length in older men: the VA normative aging study. *Psychoneuroendocrinology, 42,* 68–76.

Ineichen, B. (1979). The social geography of marriage. In M. Cook & G. Wilson (Eds.), *Love and attraction.* New York, NY: Pergamon Press.

Inglehart, R. (1990). *Culture shift in advanced industrial society.* Princeton, NJ: Princeton University Press.

Insel, T. (2013, April 29). *Director's blog: Transforming diagnosis.* Retrieved from http://www.nimh.nih.gov/about/director/2013/transforming-diagnosis.shtml

Insel, T. R. (2007, August 10). Shining light on depression. *Science, 317,* 757–758.

Insel, T. R. (2010, April). Faulty circuits. *Scientific American, 302*(4), 44–51.

Insko, C., Thibaut, J. W., Moehle, D., Wilson, M., & Diamond, W. D. (1980). Social evolution and the emergence of leadership. *Journal of Personality and Social Psychology, 39,* 441–448.

Institute of Medicine. (2002). *Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids.* Washington, DC: National Institutes of Health.

Ishai, A., & Sagi, D. (1995). Common mechanisms of visual imagery and perception. *Science, 268,* 1772–1774.

Iverson, P., Kuhl, P. K., Akahane-Yamada, R., Diesch, E., Tohkura, Y., Kettermann, A., & Siebert, C. (2003). A perceptual interference account of acquisition difficulties for non-native phonemes. *Cognition, 87,* B47–B57.

Iwamoto, K., & Kato, T. (2009). Epigenetic profiling in schizophrenia and major mental disorders. *Neuropsychobiology, 60,* 5–11. doi: 10.1159/000234811 Retrieved from http://www.karger.com/Article/Pdf/234811

Izard, C. E. (2007). Basic emotions, natural kinds, emotion schemas, and a new paradigm. *Perspectives on Psycho logical Science, 2,* 260–280.

Jablensky, A. (2000). Epidemiology of schizophrenia: The global burden of disease and disability. *Euro pean Archives of Psychiatry & Clinical Neuroscience, 250,* 274–283.

Jacobs, B. L. (1987). How hallucinogenic drugs work. *American Scientist, 75,* 386–392.

Jacobs, B. L. (2004). Depression: The brain finally gets into the act. *Current Directions in Psychological Science, 13,* 103–106.

Jacobs, L. F., & Schenk, F. (2003). Unpacking the cognitive map: The parallel map theory of hippocampal function. *Psychological Review, 110,* 285–315.

Jacobs, R. C., & Campbell, D. T. (1961). The permanence of an arbitrary tradition through several generations of a laboratory microculture. *Journal of Abnormal and Social Psychology, 62,* 649–658.

Jacobson, N. S., & Christensen, A. (1996). Studying the effectiveness of psychotherapy: How well can clinical trials do the job? *American Psychologist, 51,* 1031–1039.

Jacobson, N. S., Christensen, A., Prince, S. E., Cordova, J., & Eldridge, K. (2000). Integrative behavioral couple therapy: An acceptance-based, promising new treatment for couple discord. *Journal of Consulting and Clinical Psychology, 68,* 351–355.

Jaffe, E. (2006, March). Opening Skinner's Box causes controversy. *APS Observer, 19*(3), 17–19.

Jaffe, E. (2007, May). Mirror neurons: How we reflect on behavior. *APS Observer, 20*(5), 20–25.

James, W. (1884). What is an emotion? *Mind 9,* 188–205.

James, W. (1890/1950). *The principles of psychology* (2 vols.). New York, NY: Holt, Rinehart & Winston. (Original work published 1890.)

Janis, I. (1972). *Victims of groupthink: A psychological study of foreign-policy decisions and fiascoes.* Boston, MA: Houghton Mifflin.

Janis, I., & Mann, L. (1977). *Decision making: A psychological analysis of conflict, choice and commitment.* New York, NY: The Free Press.

Janoff-Bulman, R. (1989). The benefits of illusions, the threat of disillusionment, and the limitations of inaccuracy. *Journal of Social and Clinical Psychology, 8,* 158–175.

Janoff-Bulman, R. (1992). *Shattered assumptions: Towards a new psychology of trauma.* New York, NY: The Free Press.

Janoff-Bulman, R., & Frantz, C. M. (1997). The impact of trauma on meaning: From meaningless world to meaningful life. In M. Power & C. R. Brewin (Eds.), *The transformation of meaning in psychological therapies* (pp. 91–106). New York, NY: Wiley.

Janus, S. S., & Janus, C. L. (1993). *The Janus report on sexual behavior.* New York, NY: Wiley.

Javitt, D. C., & Coyle, J. T. (2004). Decoding schizophrenia. *Scientific American, 290,* 48–55.

Jenkins, J. H., & Barrett, R. J., (Eds.). (2004). *Schizophrenia, culture, and subjectivity: The edge of experience.* Cambridge, England: Cambridge University Press.

Jensen, A. R. (1969). How much can we boost IQ and scholastic achievement? *Harvard Educational Review, 39,* 1–123.

Jensen, A. R. (1998). The *g* factor and the de sign of education. In R. J. Sternberg & W. M. Williams (Eds.), *Intelligence, instruction, and assessment: Theory into practice.* Mahwah, NJ: Erlbaum.

Jensen, A. R. (2000). Testing: The dilemma of group differences. *Psychology, Public Policy, and Law, 6,* 121–127.

Jensen, A. R., & Figueroa, R. A. (1975). Forward and backward digit-span interaction with race and IQ: Predictions from Jensen's theory. *Journal of Educational Psychology, 67,* 882–893.

Jiang, Y., Perry, D. K., & Hesser, J. E. (2010). Adolescent suicide and health risk behaviors: Rhode Island's 2007 Youth Risk Behavior Survey. *American Journal of Preventive Medicine, 38*(5), 55–555.

Jiang, Y. H., Yuen, R. K., Jin, X., Wang, M., Chen, N., Wu, X., . . . Scherer, S. W. (2013). Detection of clinically relevant genetic variants in autism spectrum disorder by whole-genome sequencing. *American Journal of Human Genetics*, *93*(2), 249–263.

Jick, H., Kaye, J. A., & Jick, S. S. (2004, July 21). Antidepressants and the risk of suicidal behaviors. *JAMA: Journal of the American Medical Association, 292,* 338–343.

Jitendra, A. K., Griffin, C. C., Haria, P., Leh, J., Adams, A., & Kaduvettoor, A. (2007). A comparison of single and multiple strategy instruction on third-grade students' mathematical problem solving. *Journal of Educational Psychology, 99,* 115–127.

Job, V., Dweck, C. S., & Walton, G. M. (2010). Ego depletion—is it all in your head? Implicit theories about willpower affect self-regulation. *Psychological Science, 21*(11), 1686–1693.

Jobe, T. H., & Harrow, M. (2010). Schizophrenia course, long-term outcome, recovery, and prognosis. *Current Directions in Psychological Science, 19,* 220–225.

Jog, M. S., Kubota, Y., Connolly, C. I., Hillegaart, V., & Grabiel, A. M. (1999, November 26). Building neural representations of habits. *Science, 286,* 1745–1749.

John, O. P., & Srivastava, S. (1999). *The Big-Five trait taxonomy: History, measurement, and theoretical perspectives.* Retrieved from www.uoregon.edu/~sanjay/pubs/bigfive.pdf. [See also: Caprara et al., 1993; Costa & McCrae, 1992a, b]

Johnson, E. (2002, May). The laughter circuit. *Discover, 23*(5), 24–25.

Johnson, J. H., & Sarason, I. B. (1979). Recent developments in research on life stress. In V. Hamilton & D. M. Warburton (Eds.), *Human stress and cognition: An information processing approach* (pp. 205–233). Chichester, UK: Wiley.

Johnson, M. (1991). Selye's stress and the body in the mind. *Advances in Nursing Science, 7,* 38–44.

Johnson, M. H. (1998). The neural basis of cognitive development. In D. Kuhn & R. S. Siegler (Eds.), *Handbook of child psychology: Vol. 2. Cognition, perception, and language* (5th ed., pp. 1–49). New York, NY: Wiley.

Johnson, P. M., & Kenny, P. J. (2010, March 28). Dopamine D2 receptors in addiction-like reward dys-function and compulsive eating in obese rats. *Nature Neuroscience, 13,* 635–641. doi:10.1038/nn.2519.

Johnson, R. L. (2006, Fall). Editorial: The science-practice divide. *The General Psychologist, 41*(2), 4.

Johnson, R. L., & Rudmann, J. L. (2004). Psychology at community colleges: A survey. *Teaching of Psychology, 31,* 183–185.

Johnson, S. B., Blum, R. W., & Giedd, J. N. (2009). Adolescent maturity and the brain: The promise and pitfalls of neuroscience research in adolescent health policy. *Journal of Adolescent Health*, *45*(3), 216–221. doi:10.1016/j.jadohealth.2009.05.016

Johnson, W., McGue, M., & Iacono, W. G. (2009). School performance and genetic and environmental variance in antisocial behavior at the transition from adolescence to adulthood. *Developmental Psychology, 45,* 973–987.

Johnson, W., teNijenhuis, J., & Bouchard, T. J. (2008). Still just 1 *g*: Consistent results from five test batteries. *Intelligence, 36,* 81–95.

Joiner, T. E., Jr., & Schmidt, N. B. (1995). Dimensions of perfectionism, life stress, and depressed and anxious symptoms: Prospective support for diathesis-stress but not specific vulnerability among male undergraduates. *Journal of Social and Clinical Psychology, 14,* 165–183.

Jones, M. C. (1924). A laboratory study of fear: The case of Peter. *Pedagogical Seminary, 31,* 308–315.

Jonides, J., Lacey, S. C., & Nee, D. E. (2005). Processes of working memory in mind and brain. *Current Directions in Psychological Science, 14,* 2–5.

Joseph, R. (1988). Dual mental functioning in a split-brain patient. *Journal of Clinical Psychology, 44,* 770–779.

Juliano, S. L. (1998, March 13). Mapping the sensory mosaic. *Science, 279,* 1653–1654.

Julien, R. M. (2007). *A primer of drug action* (11th ed.). New York, NY: W. H. Freeman.

Jung, C. G. (1936/1959). The concept of the collective unconscious. In H. E. Read & M. Fordham (Eds.), *The archetypes and the collective unconscious, collected works* (Vol. 9, Part 1, pp. 54–77). Princeton, NJ: Princeton University Press. (Original work published 1936.)

Kabot, S., Masi, W., & Segal, M. (2003). Advances in the diagnosis and treatment of autism spectrum disorders. *Professional Psychology: Research and Practice, 34,* 26–33.

Kagan, J. (1996). Three pleasing ideas. *American Psychologist, 51,* 901–908.

Kagan, J. (1998). *Three seductive ideas.* Cambridge, MA: Harvard University Press.

Kagan, J. (2001). Temperamental contributions to affective and behavioral profiles in childhood. In S. G. Hofmann & P. M. DiBartolo (Eds.), *From social anxiety to social phobia: Multiple perspectives* (pp. 216–234). Boston, MA: Allyn & Bacon.

Kagan, J., Herschkowitz, N., & Herschkowitz, E. (2005). *Young mind in a growing brain.* Mahwah, NJ: Erlbaum Associates.

Kagan, J., Reznick, J. S., & Snidman, N. (1988). Biological basis of childhood shyness. *Science, 20,* 167–171.

Kagan, J., & Snidman, N. (1998). Childhood derivatives of high and low reactivity in infancy. *Child Development, 69,* 1483–1493.

Kagan, J., Snidman, N., Arcus, D., & Reznick, J. S. (1994). *Galen's prophecy: Temperament in human nature.* New York, NY: Basic Books.

Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist, 58,* 697–720.

Kahneman, D. (2011). *Thinking, fast and slow.* New York, NY: Farrar, Straus and Giroux.

Kahneman, D., & Klein, G. (2009). Conditions for intuitive expertise: A failure to disagree. *American Psychologist, 64*(6), 515–526. doi: 10.1037/a0016755

Kahneman, D., & Tversky, A. (2000). *Choice, values, and frames.* New York, NY: Cambridge University Press. [See also: Jacowitz & Kahneman, 1995; Tversky & Kahneman, 2000.]

Kairys, A. (2010). *Time perspective: Its links to personality traits, age, and gender.* Dissertation summary, Vilnius University, Lithuania, Social Sciences, Psychology (06S).

Kairys, A., & Liniauskaite, A. (2015). Time perspective and personality. In M. Stolarski, N. Fieulane, & W. Beck (Eds.), *Time perspective theory; review, research and application, essays in Honor of Philip G. Zimbardo* (pp. 99–113). Switzerland: Springer.

Kaiser Family Foundation. (2005). Generation M: Media in the lives of 8–18-year-olds. Retrieved from www.kff.org/entmedia/7250.cfm.

Kalman, I. (2008). *Bullies 2 buddies: Victim proof your school.* New York, NY: The Wisdom Press. Also see www.Bullies-2Buddies.com

Kamil, A. C., Krebs, J., & Pulliam, H. R. (1987). *Foraging behavior.* New York, NY: Plenum.

Kamin, L. (1994, November 23). Intelligence, IQ tests, and race. *Chronicle of Higher Education,* p. B5.

Kamin, L. J. (1995, February). Book review: Behind the curve. *Scientific American, 272,* 99–103.

Kandel, D. B. (1978). Similarity in real-life adolescent friendship pairs. *Journal of Personality and Social Psychology, 36,* 306–312.

Kandel, E. (2000, November 10). Neuroscience: Breaking down scientific barriers to the study of brain and mind. *Science, 290,* 1113–1120.

Kandel, E. R., & Hawkins, R. D. (1992, September). The biological basis of learning and individuality. *Scientific American, 267,* 79–86.

Kandel, E. R., & Squire, L. R. (2000, November 10). Neuroscience: Breaking down scientific barriers to the study of brain and mind. *Science, 290,* 1113–1120. [See also: Heeger, 1994; Hubel & Wiesel, 1979; Lettvin et al., 1959; Maunsell, 1995; Zeki, 1992]

Kantrowitz, B. (1992, January 27). A head start does not last. *Newsweek, 119,* pp. 44–45.

Kanwisher, N. (2006, February 3). What's in a face? *Science, 311,* 617–618. [See also Gross, 2005.]

Karlsen, C. F. (1998). *The devil in the shape of a woman: Witchcraft in colonial New England.* New York, NY: W. W. Norton & Company.

Karlsgodt, K. H., Sun, D., & Cannon, T. D. (2010). Structural and functional brain abnormalities in schizophrenia. *Current Directions in Psychological Science, 19,* 226–231. [See also: Sawa & Snyder, 2002.]

Kasamatsu, A., & Hirai, T. (1966). An electroencephalographic study on the Zen meditation (Zazen). *Folia Psychiatrica et Neurologica Japonica, 20,* 315–336.

Kassam, K. S., Markey, A. R., Cherkassky, V. L., Loewenstein, G., & Just, M. A. (2013). Identifying emotions on the basis of neural activation. *PLoS One* 8(6): e66032. doi:10.1371/journal.pone.0066032

Kassin, S. (2001). Confessions: Psychological and forensic aspects. In N. J. Smelser & P. B. Baltes (Eds.), *International encyclopedia of the social & behavioral sciences*. Amsterdam: Elsevier.

Kato, T., Iwamoto, K., Kakiuchi, C., Kuratomi, G., & Okazaki, Y. (2005). Genetic or epigenetic difference causing discordance between monozygotic twins as a clue to molecular basis of mental disorders. *Molecular Psychiatry 10,* 622–630. Retrieved from http://www.nature.com/mp/journal/v10/n7/full/4001662a.html

Katz, J., & Moore, J. (2013). Bystander education training for campus sexual assault prevention: An initial meta-analysis. *Violence and Victims, 28*(6), 1054–1067.

Kaufman, G., Raphael, L., & Espeland, P. (1999). *Stick up for yourself: Every kid's guide to personal power and positive self-esteem.* Minneapolis, MN: Free Spirit Publishing.

Kaufman, J. C., & Sternberg, R. J. (2010). *The Cambridge handbook of creativity.* New York, NY: Cambridge University Press.

Kazdin, A. E. (1994). *Behavior modification in applied settings* (5th ed.). Pacific Grove, CA: Brooks/Cole.

Kazdin, A. E. (2008). Evidence-based treatment and practice: New opportunities to bridge clinical research and practice, enhance the knowledge base, and improve patient care. *American Psychologist, 63,* 146–159.

Kazdin, A. E., & Blasé (2011). Rebooting psychotherapy research and practice to reduce the burden of mental illness. *Perspectives on Psychological Science, 6,* 21–37.

Keating, D. P. (2004). Cognitive and brain development. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (2nd ed., pp. 45–84). Hoboken, NJ: Wiley.

Keel, P. K., & Klump, K. L. (2003). Are eating disorders culture-bound syndromes? Implications for conceptualizing their etiology. *Psychological Bulletin, 129,* 747–769.

Keen, S. (1991). *Faces of the enemy: Reflections of the hostile imagination.* San Francisco, CA: Harper.

Keidel, G. C. (2002). Burnout and depressioin among hospice caregivers. *American Journal of Hospice and Palliative Care, 19,* 200–205.

Keller, M. B., McCullough, J. P., Klein, D. N., Arnow, B., Dunner, D. L., Gelenberg, A. J., . . . Zajecka, J. (2000, May 18). A comparison of nefazodone, the cognitive behavioral-analysis system of psychotherapy, and their combination for the treatment of chronic depression. *New England Journal of Medicine, 342,* 1462–1470.

Kelley, J. E., Lumley, M. A., & Leisen, J. C. C. (1997). Health effects of emotional disclosure in rheumatoid arthritis patients. *Health Psychology, 16,* 331–340.

Kemeny, M. E. (2003). The psychobiology of stress. *Current Directions, 12,* 124–129.

Kendler, H. H. (2005). Psychology and phenomenology: A clarification. *American Psychologist, 60,* 318–324.

Kendler, K. S., & Gardner, C. O., Jr. (1998). Boundaries of major depression: An evaluation of DSM-IV criteria. *American Journal of Psychiatry, 155,* 172–177.

Kendler, K. S., Hettema, J. M., Butera, F., Gardner, C. O., & Prescott, C. A. (2003). Life event dimensions of loss, humiliation, entrapment, and danger in the prediction of onsets of major depression and generalized anxiety. *Archives of General Psychiatry, 60,* 789–796.

Kenealy, P. (1997). Key components of the Mozart Effect. *Perceptual and Motor Skills, 86,* 835–841.

Kenrick, D. T., & Funder, D. C. (1988). Profiting from controversy: Lessons from the person–situation debate. *American Psychologist, 43,* 23–34.

Kenrick, D. T., Griskevicius, V., Neuberg, S. L., & Schaller, M. (2010). Renovating the pyramid of needs: Contemporary extensions built upon ancient foundations. *Perspectives on Psychological Science, 5,* 292–314.

Kenrick, D. T., & Stringfield, D. O. (1980). Personality traits and the eye of the beholder: Crossing some traditional philosophical boundaries in the search for consistency in all of the people. *Psychological Review, 87,* 88–104.

Kern, M. L., & Friedman, H. S. (2008). Do conscientious individuals live longer? A quantitative review. *Health Psychology, 27,* 505–512.

Kershaw, S. (2010, January 9). The terrorist mind: An Update. *New York Times*. Retrieved from www.nytimes.com/2010/01/10/weekinreview/10kershaw.html?emc=eta1&pagewanted=print.

Kesebir, S., Graham, J., & Oishi, S. (2010). A theory of human needs should be human-centered, not animal-centered: Commentary on Kenrick et al. (2010). *Perspectives on Psychological Science, 5,* 315–319.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Koretz, D., Merikangas, K. R., . . . Wang, P. S. (2003, June). The epidemiology of major depressive disorder: Results from the National Comorbidity Survey Replication (NCS-R). *Journal of the American Medical Association, 289,* 3095–3105.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005a). Lifetime prevalence and age-of-onset distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*(6), 593-602. doi:10.1001/archpsyc.62.6.593

Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of twelve-month DSM-IV disorders in the National Comorbidity Survey Replication (NCS-R). *Archives of General Psychiatry, 62,* 617–27.

Keynes, R. (2002). *Darwin, his daughter, and human evolution.* New York, NY: Penguin Putnam.

Keysers, C. (2010). Mirror neurons. *Current Biology, 19,* 971–973.

Kiecolt-Glaser, J. K., & Glaser, R. (1987). Psychosocial moderators of immune function. *Annals of Behavioral Medicine, 9,* 16–20.

Kiecolt-Glaser, J. K., & Glaser, R. (2001). Stress and immunity: Age enhances the risks. *Current Directions in Psychological Science, 10,* 18–21.

Kiehl, K. A., & Buckholtz, J. W. (2010, September/October). Inside the mind of a psychopath. *Scientific American Mind, 21*(4), 22–29.

Kierein, N. M., & Gold, M. A. (2000). Pygmalion in work organizations: A meta-analysis. *Journal of Organizational Behavior, 21,* 913–928.

Kieseppa, T., Partonen, T., Haukka, J., Kaprio, J., & Lonnqvist, J. (2004). High concordance of bipolar I disorder in a nationwide sample of twins. Retrieved from http://ajp.psychiatryonline.org/cgi/reprint/161/10/1814.

Kiesler, C. A. (1982). Mental hospitals and alternative care: Noninstitutionalization as potential public policy for mental patients. *American Psychologist, 37,* 349–360.

Kiesler, C. A. (1993). Mental health policy and mental hospitalization. *Current Directions in Psychological Science, 2,* 93–95.

Kiester, E. (1980, May/June). Images of the night. *Science, 80,* 36–42.

Kihlstrom, J. F. (1985). Hypnosis. *Annual Review of Psychology, 36,* 385–418.

Kihlstrom, J. F. (1987). The cognitive unconscious. *Science, 237,* 1445–1452.

Kihlstrom, J. F. (1990). The psychological unconscious. In L. Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 445–464). New York, NY: Guilford Press.

Kihlstrom, J. F. (2013). The Person–situation interaction. In D. Carlston (Ed.), *Oxford handbook of social cognition*. New York, NY: Oxford University Press.

Kihlstrom, J. F., Barnhardt, T. M., & Tartaryn, D. J. (1992). The psychological unconscious: Found, lost, and regained. *American Psychologist, 47,* 788–791.

Killingsworth, M. A., & Gilbert, D. T. (2010). A wandering mind is an unhappy mind. *Science, 330,* 932.

Kilner, J. M., & Lemon, R. N. (2013). What we know currently about mirror neurons. *Current Biology, 23*(23), R1057–R1062.

Kim, E., & Markus, H. R. (1999). Deviance or uniqueness, harmony or conformity? A cultural analysis. *Journal of Personality and Social Psychology, 77*(4), 785–800.

Kim, H. S. (2002). We talk, therefore we think? A cultural analysis of the effects of talking on thinking. *Journal of Personality and Social Psychology, 83,* 828–842.

Kim, J., & Hatfield, E. (2004). Love types and subjective well-being. *Social Behavior and Personality: An International Journal, 32,* 173–182.

Kim, K. M., Baratta, M. V., Yang, A., Lee, D., Boyden, E., & Fiorillo, C. (2012, April 10). Optogenetic mimicry of the transient activation of dopamine neurons by natural reward is sufficient for operant reinforcement. *PLoS One, 7*(4).

Kimble, G. A. (1991). The spirit of Ivan Petrovich Pavlov. In G. A. Kimble, M. Wertheimer, & C. L. White (Eds.), *Portraits of pioneers in psychology* (pp. 26–40). Washington, DC: American Psychological Association.

Kincade, K. (1973). *A Walden Two experiment: The first five years of Twin Oaks Community.* New York, NY: Morrow.

Kindt, M., Soeter, M., & Vervliet, B. (2009). Beyond extinction: Erasing human fear responses and preventing the return of fear. *Nature Neuroscience, 12,* 256–258.

Kinetz, E. (2006, September 26). Is hysteria real? Brain images say yes. *New York Times.* Retrieved from www.nytimes.com/2006/09/26/science/26hysteria.html?pagewanted=1&sq=Is%20hysteria%20real?&st=nyt&scp=1.

King, B. M. (2013). The modern obesity epidemic, ancestral hunter-gatherers, and the sensory/reward control of food intake. *American Psychologist, 68*(2), 88–96.

King, P. M., & Kitchener, K. S. (1994). *Developing reflective judgment: Understanding and promoting intellectual growth and critical thinking in adolescents and adults.* San Francisco, CA: Jossey-Bass.

Kinsey, A. C., Pomeroy, W. B., & Martin, C. E. (1948). *Sexual behavior in the human male.* Philadelphia, PA: Saunders.

Kinsey, A. C., Pomeroy, W. B., Martin, C. E., & Gebhard, P. H. (1953). *Sexual behavior in the human female.* Philadelphia, PA: Saunders.

Kirkpatrick, L. A., & Shaver, P. R. (1992). An attachment-theoretical approach to romantic love and religious belief. *Personality and Social Psychology Bulletin, 18,* 266–275.

Kirsch, I., & Braffman, W. (2001). Imaginative suggestibility and hypnotizability. *Current Directions in Psychological Science, 10,* 57–61.

Kirsch, I., & Lynn, S. J. (1995). Altered state of hypnosis: Changes in the theoretical landscape. *American Psychologist, 50,* 846–858.

Kirsch, I., & Lynn, S. J. (1998). Dissociation theories of hypnosis. *Psychological Bulletin, 123,* 100–115. [See also: Kihlstrom, 1998; Woody & Sadler, 1998.]

Kitayama, S., Duffy, S., Kawamura, T., & Larsen, J. T. (2003). Perceiving an object and its context in different cultures: A cultural look at new look. *Psychological Science, 14,* 201–206.

Klag, M. J., Whelton, P. K., Grim, C. E., & Kuller, L. H. (1991). The association of skin color with blood pressure in U.S. blacks with low socioeconomic status. *Journal of the American Medical Association, 265,* 599–602.

Klagsbrun, F. (1985). *Married people: Staying together in the age of divorce.* New York, NY: Bantam Books.

Klein, P. J., & Meltzoff, A. M. (1999). Long-term memory, forgetting, and deferred imitation in 12-month-old infants. *Developmental Science, 2,* 102–113.

Kleinfeld, J. (1994). Learning styles and culture. In W. J. Lonner & R. Malpass, *Psychology and culture* (pp. 151–156). Boston: Allyn & Bacon.

Kleinman, A., & Cohen, A. (1997). Psychiatry's global challenge. *Scientific American, 276*(3), 86–89.

Kleinmuntz, B., & Szucko, J. J. (1984). Lie detection in ancient and modern times: A call for contemporary scientific study. *American Psychologist, 39,* 766–776.

Klinger, E. (1987, May). The power of daydreams. *Psychology Today,* 37–44.

Kluger, J. (2010, August 16). What animals think. *Time, 176*(7).

Kluver, H., & Bucy, P. C. (1939). Preliminary analysis of temporal lobes in monkeys. *Archives of Neurology and Psychiatry, 42,* 979–1000.

Knapp, S., & VandeCreek, L. (2003). An overview of the major changes in the 2002 APA Ethics Code. *American Psychologist, 34,* 301–308. [See also: Ilgen & Bell, 1991; Rosenthal, 1994a.]

Knudsen, E. I. (2004). Sensitive periods in the development of the brain and behavior. *Journal of Cognitive Neuroscience, 16*(8), 1412–1425.

Knecht, S., Flöel, A., Dräger, B., Breitenstein, C., Sommer, J., Henningsen, H., . . . Pascual-Leone, A. (2002, July 1). Degree of language lateralization determines susceptibility to unilateral brain lesions. *Nature Neuroscience, 5,* 695–699.

Knox, D., & Schact, C. (2008). *Choices in relationships: An introduction to marriage and the family.* Belmont, CA: Thomson.

Kobasa, S. O., Hilker, R. R., & Maddi, S. R. (1979). Who stays healthy under stress? *Journal of Occupational Medicine, 21,* 595–598.

Kochanska, G., Barry, R. A., Jimenez, N. B., Hollatz, A. L., & Woodard, J. (2009). Guilt and effortful control: Two mechanisms that prevent disruptive developmental trajectories. *Journal of Personality and Social Psychology, 97,* 322–333.

Kochanska, G., Barry, R. A., Stellern, S. A., & O'Bleness, J. J. (2009). Early attachment organization moderates the parent–child mutually coercive pathway to children's antisocial conduct. *Child Development, 80,* 1288–1300.

Koechlin, E., Ody, C., & Kouneiher, F. (2003, November 14). The architecture of cognitive control in the human prefrontal cortex. *Science, 302,* 1181–1185.

Koenig, R. (2014, October 22). Brain-training companies get advice from some academics, criticism from others. *Chronicle of Higher Education.* Retrieved from http://chronicle.com/article/Brain-Training-Companies-Get/149555/

Kohlberg, L. (1964). Development of moral character and moral ideology. In M. L. Hoffman & L. W. Hoffman (Eds.), *Review of child development research* (Vol. 1). New York, NY: Russell Sage Foundation.

Kohlberg, L. (1968, April). The child as a moral philosopher. *Psychology Today, 2*(4), 25–30.

Kohlberg, L. (1981). *The philosophy of moral development.* New York, NY: Harper & Row.

Köhler, W. (1925). *The mentality of apes.* New York, NY: Harcourt Brace Jovanovich.

Köhler, W. (1947). *Gestalt psychology* (2nd ed.). New York, NY: LiveRight.

Kohn, P. M., Barnes, G. E., & Hoffman, F. M. (1979). Drug-use history and experience seeking among adult male correctional inmates. *Journal of Consulting and Clinical Psychology, 47,* 708–715.

Kohn, S. J., & Smith, G. C. (2003). The impact of downward social comparison processes on depressive symptoms in older men and women. *Ageing International, 28,* 37–65.

Kohout, J. (2001, February). Facts and figures: Who's earning those psychology degrees? *Monitor on Psychology, 32*(2). Retrieved from www.apa.org/monitor/feb01/facts.html.

Kohout, J., & Wicherski, M. (2000, December). Where are the new psychologists working? *Monitor on Psychology,* 13.

Kolb, B. (1989). Development, plasticity, and behavior. *American Psychologist, 44,* 1203–1212.

Koltko-Rivera, M. E. (2006). Redisovering the later version of Maslow's hierarchy of needs: Self- transcendence and opportunities for theory, research, and unification. *Review of General Psychology, 10,* 302–317.

Kopta, S. M., Lueger, R. J., Saunders, S. M., & Howard, K. I. (1999). Individual psychotherapy outcome and process research: Challenges leading to greater turmoil or a positive transition? *Annual Review of Psychology, 30,* 441–469.

Kosko, B., & Isaka, S. (1993, July). Fuzzy logic. *Scientific American, 269,* 76–81.

Kosslyn, S. M. (1976). Can imagery be distinguished from other forms of internal representation? Evidence from studies of information retrieval times. *Memory and Cognition, 4,* 291–297.

Kosslyn, S. M. (2005). Mental images and the brain. *Cognitive Neuropsychology, 22,* 333–347.

Kosslyn, S. M., Cacioppo, J. T., Davidson, R. J., Hugdahl, K., Lovallo, W. R., Speigel, D., & Rose, R. (2002). Bridging psychology and biology: The analysis of individuals in groups. *American Psychologist, 57,* 341–351. [See also: Davidson, 1992a, b; 2000a, b; Heller et al., 1998.]

Kotchoubey, B. (2002). Do event-related brain potentials reflect mental (cognitive) operations? *Journal of Psychophysiology, 16,* 129–149.

Koyama, T., McHaffie, J. G., Laurienti, P. J., & Coghill, R. C. (2005, September 6). The subjective experience of pain: Where expectations become reality. *Proceedings of the National Academy of Sciences, 102,* 12950–12955.

Krackow, A., & Blass, T. (1995). When nurses obey or defy inappropriate physician orders: Attributional differences. *Journal of Social Behavior and Personality, 10,* 585–594.

Krakovsky, M. (2005, February 2). Dubious "Mozart effect" remains music to many Americans' ears. *Stanford Report.* Retrieved from http://news-service.stanford.edu/news/2005/february2/mozart-020205.html.

Krakovsky, M. (2007, February). Unsettled scores. *Scientific American, 296*(2), 13–14.

Kramer, A. D. I., Guillory, J. E., & Hancock, J. T. (2014). Experimental evidence of massive-scale emotional contagion through social networks. *Proceedings of the National Academy of Sciences of the United States of America, 111*(24), 8788–8790.

Kramer, P. D. (1993). *Listening to Prozac: A psychiatrist explores antidepressant drugs and the remaking of the self.* New York, NY: Viking.

Krampe, R. T., & Ericsson, K. A. (1996). Maintaining excellence: Deliberate practice and elite performance in young and older pianists. *Journal of Experimental Psychology: General, 125,* 331–359.

Krantz, D. S., Grunberg, N. E., & Baum, A. (1985). Health psychology. *Annual Review of Psychology, 36,* 349–383.

Krätzig, G. P., & Arbuthnott, K. D. (2006). Perceptual learning style and learning proficiency: A Test of the Hypothesis. *Journal of Educational Psychology, 98,* 238–246.

Kringen, J. A. (2006, April 3). How we've improved intelligence: Minimizing the risk of "groupthink." Editorial. *Washington Post,* p. A19.

Krueger, R. F., & Markon, K. E. (2006). Understanding psychopathology: Melding behavior genetics, personality, and quantitative psychology to develop an empirically based mode. *Current Directions in Psychological Science, 15,* 113–117.

Krupnick, J. L., Sotsky, S. M., Simmens, S., Moyer, J., Elkin, I., Watkins, J., & Pilkonis, P. A. (1996). The role of the therapeutic alliance in psychotherapy and pharmacotherapy outcome: Findings in the National Institute of Mental Health Treatment of Depression Collaborative Research Program. *Journal of Consulting and Clinical Psychology, 64,* 532–539.

Kucharski, R., Maleszka, J., Foret, S., & Maleszka, R. (2008). Nutritional control of reproductive status in honeybees via DNA methylation. *Science, 319,* 1827–1830.

Kuhn, S., & Gallinat, J. (2014). Brain structure and functional connectivity associated with pornography consumption: The brain on porn. *JAMA Psychiatry, 71*(7), 827–834. doi:10.1001/jamapsychiatry.2014.93

Kuiper, N. A., Martin, R. A. & Olinger, L. J. (1993). Coping humor, stress, and cognitive appraisals. *Canadian Journal of Behavioural Science, 25*(1), 81–96.

Kukla, A. (1989). Nonempirical issues in psychology. *American Psychologist, 44,* 785–794.

Kurdek, L. A. (2005). What do we know about gay and lesbian couples? *Current Directions in Psychological Science, 14,* 251–254.

Kurth, S., Ringluim M., Geiger, A., LeBourgeois, M., Jennie, O. G., & Huber, R. (2010). Mapping of cortical activity in the first two decades of life: A high-density sleep electroencephalogram study. *Journal of Neuroscience, 30*(40), 13211–13219.

Lacey, M., & Herszenhorn, D. M. (2011, January 8). In attack's wake, political repercussions. *New York Times.* Retrieved from www.nytimes.com/2011/01/09/us/politics/09giffords.html?_r=1.

Lachman, M. E., & Weaver, S. L. (1998). The sense of control as a moderator of social class differences in health and well-being. *Journal of Personality and Social Psychology, 74,* 763–773.

Lachman, R., Lachman, J. L., & Butterfield, E. C. (1979). *Cognitive psychology and information processing: An introduction.* Hillsdale, NJ: Erlbaum.

Lama, D. (His Holiness). (2007). *How to see yourself as you really are* (J. Hopkins, Trans.). New York, NY: Simon & Schuster.

Lamb, M. E. (1999, May/June). Mary D. Salter Ainsworth, 1913–1999, attachment theorist. *APS Observer, 32,* 34–35.

Lambo, T. A. (1978). Psychotherapy in Africa. *Human Nature, 1*(3), 32–39.

Landesman, S., & Butterfield, E. C. (1987). Normalization and deinstitutionalization of mentally retarded individuals: Controversy and facts. *American Psychologist, 42,* 809–816.

Landry, D. W. (1997, February). Immunotherapy for cocaine addiction. *Scientific American, 276*(2), 42–45.

Lane, E. (2006, July 28). Neuroscience in the courts—A revolution in justice? *Science, 313,* 458.

Lang, F. R., & Carstensen, L. L. (1994). Close emotional relationships in late life: Further support for proactive aging in the social domain. *Psychology and Aging, 9,* 315–324.

Lang, P. J., & Lazovik, D. A. (1963). The experimental desensitization of a phobia. *Journal of Abnormal and Social Psychology, 66,* 519–525.

Langens, T. A. (2003). Daydreaming mediates between goal commitment and goal attainment in individuals high in achievement motivation. *Imagination, Cognition and Personality, 22*(2), 103–115.

Lankford, A. (2013). *The myth of martyrdom: What really drives suicide bombers, rampage shooters, and other self-destructive killers.* New York, NY: Macmillan.

Langleben, D. D., Schroeder, L., Maldjian, J. A., Gur, R. C., McDonald, S., Ragland, J. D., . . . Childress, A. R. (2002). Brain activity during imulated deception: An event-related functional magnetic resonance study. *NeuroImage, 15,* 727–732.

Langlois, J. H., Roggman, L. A., Casey, R. J., Ritter, J. M., Rieser-Danner, L. A., & Jenkins, V. Y. (1987). Infant preferences for attractive faces: Rudiments of a stereotype. *Developmental Psychology, 23,* 363–369.

Lara, C., Fayyad, J., de Graaf, R., Kessler, R. C., Aguilar-Gaxiola, S., Angermeyer, M., . . . Sampson, N. (2009). Childhood predictors of adult attention-deficit/hyperactivity disorder: results from the World Health Organization World Mental Health Survey Initiative. *Biological Psychiatry, 65,* 46–54.

Larson, E. B., Wang, L., Bowen, J. D., McCormick, W. C., Teri, L., Crane, P., & Kukuli, W. (2006). Exercise is associated with reduced risk for incident dementia among persons 65 years of age and older. *Annals of Internal Medicine, 144,* 73–81.

Larson, R. W. (2001). How U.S. children and adolescents spend time: What it does (and doesn't) tell us about their development. *Current Directions in Psychological Science, 10,* 160–164.

Lash, J. (2001). Dealing with the tinder as well as the flint. *Science, 294,* 1789.

Latané, B., & Darley, J. M. (1968). Group inhibition of bystander intervention in emergencies. *Journal of Personality and Social Psychology, 10,* 215–221.

Laumann, E. O., Gagnon, J. H., Michael, R. T., & Michaels, S. (1994). *The social organization of sexuality: Sexual practices in the United States.* Chicago, IL: University of Chicago Press.

Lazarus, R. S. (1981, July). Little hassles can be hazardous to your health. *Psychology Today,* 58–62.

Lazarus, R. S. (1984). On the primacy of cognition. *American Psychologist, 39,* 124–129.

Lazarus, R. S. (1999). *Stress and emotion: A new synthesis.* London, UK: Free Association Press.

Lazarus, R. S., DeLongis, A., Folkman, S., & Gruen, R. (1985). Stress and adaptational outcomes: The problem of confounded measures. *American Psychologist, 40,* 770–779.

Leach, A. (2010, November 16). *The problem with cyber-bullying is the bullying not the cyber bit, says social researcher Danah Boyd.* www.shinyshiny.tv/2010/11/social_researcher_cyber_bullying.html.

Leaper, C., Anderson, K. J., & Sanders, P. (1998). Moderators of gender effects on parents' talk to their children: A meta-analysis. *Developmental Psychologist, 34,* 3–27.

Learman, L. A., Avorn, J., Everitt, D. E., & Rosenthal, R. (1990, July). Pygmalion in the nursing home. The effects of caregiver expectations on patient outcomes. *Journal of American Geriatrics Society, 38*(7), 797–803.

LeDoux, J. (2002). *Synaptic self: How our brains become who we are.* New York, NY: Viking. [See also: Canli et al., 2002; Carpenter, 2001a; Craik et al., 1999; Davidson, 2002; Zuckerman, 1995]

LeDoux, J. E. (1994). Emotion, memory and the brain. *Scientific American, 270*(6), 50–57.

LeDoux, J. E. (1996). *The emotional brain: The mysterious underpinnings of emotional life.* New York, NY: Simon & Schuster. [See also Barinaga, 1996; Singer, 1995.]

LeDoux, J. E. (2000). Emotion circuits in the brain. *Annual Review of Neuroscience, 23,* 155–184.

Lee, I. M. (2003). Physical activity and cancer prevention—data from epidemiologic studies. *Medicine and Science in Sports and Exercise, 35*(11), 1823–1827.

Lee, J. L. (2009, August 29). What do you see? *Science News, 176*(5), 22–25.

Lehrer, J. (2010, December, 11/12) Are heroes born, or can they be are made? *Wall Street Journal,* p. C12. Retrieved from http://online.wsj.com/article/SB10001424052748704156304576003963233286324.html.

Leichtman, M. D. (2006). Cultural and maturational influences on long-term event memory. In C. TamisLeMonda & L. Balter (Eds.), *Child psychology: A handbook of contemporary issues* (2nd ed.). Philadelphia, PA: Psychology Press.

Lefcourt, H. M. (2000). *Humor: The psychology of living buoyantly.* Kluwer.

Leiss, W., Kline, S., Jhally, S., & Botterill, J. (2005). *Social communication in advertising: Consumption in the mediated marketplace.* London, England: Taylor & Francis.

Leiter, M. P., & Maslach, C. (2014). Interventions to prevent and alleviate burnout. In M. P. Leiter, A. B. Bakker, & C. Maslach (Eds.), *Burnout at work: A psychological perspective* (pp. 145–167). London, England: Psychology Press.

Lensing, V. (2001). Grief support: The role of funeral service. *Journal of Loss and Trauma, 6,* 45–63.

Leonard, J. (1998, May–June). Dream-catchers: Understanding the biological basis of things that go bump in the night. *Harvard Magazine, 100,* 58–68.

Lepper, M. R., Greene, D., & Nisbett, R. E. (1973). Undermining children's intrinsic interest with extrinsic reward: A test of the over-justification hypothesis. *Journal of Personality and Social Psychology, 28*(1), 129–137.

Lerner, R. M., Orlos, J. R., & Knapp, J. (1976). Physical attractiveness, physical effectiveness and self-concept in adolescents. *Adolescence, 11,* 313–326.

Lesgold, A. (1988). Problem solving. In R. J. Sternberg & E. E. Smith (Eds.), *The psychology of human thought.* New York, NY: Cambridge University Press.

Leshner, A. I. (1997, October 3). Addiction is a brain disease, and it matters. *Science, 278,* 45–47.

Leslie, M. (2000, July/August). The vexing legacy of Lewis Terman. *Stanford, 28*(4), 44–51.

Let's Move. (n.d.) *Learn the facts.* Retrieved from http://www.letsmove.gov/learn-facts/epidemic-childhood-obesity

Leutwyler, K. (1994, March). Prosthetic vision: Workers resume the quest for a seeing-eye device. *Scientific American, 270,* 108.

Levenson, R. W. (1992). Autonomic nervous system differences among emotions. *Psychological Science, 3,* 23–27.

Leventhal, H., & Tomarken, A. J. (1986). Emotion: Today's problems. *Annual Review of Psychology, 37,* 565–610.

Levine, K., Shane, H. C., & Wharton, R. H. (1994). What if . . .: A plea to professionals to consider the risk–benefit ratio of facilitated communication. *Mental Retardation, 32*(4), 300–304.

Levine, L. J. (1997). Reconstructing memory for emotions. *Journal of Experimental Psychology: General, 126,* 165–177.

Levine, L. J., & Bluck, S. (2004). Painting with broad strokes: Happiness and the malleability of event memory. *Cognition & Emotion, 18,* 559–574.

Levine, L. J., & Safer, M. A. (2002). Sources of bias in memory for emotions. *Current Directions in Psychological Science, 11,* 169–173.

Levine, M., & Perkins, D. V. (1987). *Principles of community psychology: Perspectives and applications.* New York, NY: Oxford University Press.

Levine, M. W., & Shefner, J. (2000). *Fundamentals of sensation & perception.* New York, NY: Oxford University Press.

Levinson, D. J. (1978). *The seasons of a man's life.* New York, NY: Knopf.

Levinson, D. J. (1986). A conception of adult development. *American Psychologist, 41*(1), 3–13.

Levinson, D. J. (1996). *The seasons of a woman's life.* New York, NY: Knopf.

Levinthal, C. F. (2008). *Drugs, behavior, and modern society.* Boston, MA: Pearson Education.

Levitin, D. J. (2006). *This is your brain on music: The science of a human obsession.* New York, NY: Dutton.

Levitt, S. D., & Dubner, S. J. (2005). *Freakonomics: A rogue economist explores the hidden side of everything.* New York, NY: HarperCollins.

Levy, S. R., Stroessner, S. J., & Dweck, C. S. (1998). Stereotype formation and endorsement: The role of implicit theories. *Journal of Personality and Social Psychology, 74,* 1421–1436.

Lewinsohn, P. M., Clarke, G. N., Hops, H., & Andrews, J. A. (1990). Cognitive-behavioral treatment for depressed adolescents. *Behavior Therapy, 21,* 385–401.

Lewinsohn, P. M., & Gotlib, I. H. (1995). Behavioral theory and treatment of depression. In E. E. Beckham, & W. R. Leber (Eds.), *Handbook of depression* (2nd ed., pp. 352–375). New York, NY: Guilford Press.

Lewinsohn, P. M., Sullivan, J. M., & Grosscup, S. J. (1980). Changing reinforcing events: An approach to the treatment of depression. *Psychotherapy: Theory, Research and Practice, 17,* 322–334.

Lewis, T. L., & Maurer, D. (2005). Multiple sensitive periods in human visual development: Evidence from visually deprived children. *Developmental Psychobiology, 46,* 163–183.

Lewy, A. J., Lefler, B. J., Emens, J. S., & Bauer, V. K. (2006). The circadian basis of winter depression. *PNAS Proceedings of the National Academy of Sciences of the United States of America, 103,* 7414–7419. [See also Wehr & Rosenthal, 1989]

Ley, R. (1990). *A whisper of espionage; Wolfgang Kohler and the apes of Tenerife.* Garden City Park, NY: Avery Publishing Group Inc.

Li, J. (2005). Mind or virtue: Western and Chinese beliefs about learning. *Current Directions in Psychological Science, 14,* 190–194.

Lieberman, J. A., Stroup, T. S., McEvoy, J. P., Schwartz, M. S., Rosenheck, R. A., Perkins, D. O., . . . Hsiao, J. K. (2005). Effectiveness of antipsychotic drugs in patients with chronic schizophrenia. *The New England Journal of Medicine, 353,* 1209–1223.

Lieberman, M. D., & Rosenthal, R. (2001). Why introverts can't always tell who likes them: Multitasking and nonverbal decoding. *Journal of Personality and Social Psychology, 80,* 294–310.

Liegeois, F., Baldeweg, T., Connelly, A., Gadian, D. G., Mishkin, M., & Vargha-Khadem, F. (2001). Language fMRI abnormalities associated with FOXP2 gene mutation. *Nature Neuroscience, 11,* 1230–1237.

Liem, R., & Rayman, P. (1982). Health and social costs of unemployment: Research and policy considerations. *American Psychologist, 37,* 1116–1123.

Light, K. C., Grewen, K. M., & Amico, J. A. (2005). More frequent partner hugs and higher oxytocin levels are linked to lower blood pressure and heart rate in premenopausal women. *Biological Psychology, 69,* 5–21.

Lilienfeld, S. O. (2007). Psychlgical treatments that cause harm. *Perspectives on Psychological Science, 2,* 53–70. doi: 10.1111/j.1745-6916.2007.00029.x.

Lilienfeld, S. O., & Arkowitz, H. (2009, November/December). Foreign afflictions: Do psychological disorders differ across cultures? *Scientific American Mind, 20*(6), 68–69.

Lilienfeld, S. O., & Arkowitz, H. (2014, May1). The truth about shock therapy. *Scientific American Mind.* Retrieved from http://www.scientificamerican.com/article/the-truth-about-shock-therapy/

Lilienfeld, S. O., Lynn, S. J., Ruscio, J., & Beyerstein, B. L. (2010). *50 great myths of popular psychology.* West Sussex, UK: Wiley-Blackwell.

Lillard, A. (1999). Developing a cultural theory of mind: The CIAO approach. *Current Directions in Psychological Science, 8,* 57–61.

Lillard, A. S. (1997). Other folks' theories of mind and behavior. *Psychological Science, 8,* 268–274. [See also: Miller, 1984; Morris & Peng, 1994]

Linebarger, D. L., Kosanic, A. Z., Greenwood, C. R., & Docku, N. S. (2004). Effects of viewing the television program "Between the Lions" on the emergent literacy skills of young children. *Journal of Educational Psychology, 96,* 297–308.

Lipsey, M. W., & Wilson, D. B. (1993). The efficacy of psychological, educational, and behavioral treatment: Confirmation from meta-analysis. *American Psychologist, 48,* 1181–1209.

Lipsitt, L. P., Reilly, B., Butcher, M. G., & Greenwood, M. M. (1976). The stability and interrelationships of newborn sucking and heart rate. *Developmental Psychobiology, 9,* 305–310.

Liu, W., Vichienchom, K., Clements, M., DeMarco, S. C., Hughes, C., McGucken, E., . . . Greenberg, R. (2000, October). A neuro-stimulus chip with telemetry unit for retinal prosthetic device. *IEEE Journal of Solid-State Circuits, 35,* 1487–1497.

Liu, Z., Richmond, B. J., Murray, E. A., Saunders, R. C., Steenrod, S., & Stubblefield, B. K. (2004, Auguest 9). DNA targeting of rhinal cortex D2 receptor protein reversible blocks learning of cues that predict reward. *PNAS Online, 101*(33). Retrieved from www.pnas.org/cgi/content/full/101/33/12336?hits=10&FIRSTI_DEX=0&FULLTEXT=rhinal+cortex+D2+receptor&SEARCHID=1094432333655_2912&gca=pnas%3B101%2F33%2F12336&.

Livi, S., Caprara, G. V., Alessandri, G., & Pierro, A. (2015). Positivity within teamwork: Cross levels effects of positivity on performance. *Personality and Individual Differences, 85,* 230–235.

Loftus, E. F. (1979). *Eyewitness testimony.* Cambridge, MA: Harvard University Press.

Loftus, E. F. (1984). The eyewitness on trial. In B. D. Sales & A. Alwork (Eds.), *With liberty and justice for all.* Englewood Cliffs, NJ: Prentice Hall.

Loftus, E. F. (1993). The reality of repressed memories. *American Psychologist, 48,* 518–537.

Loftus, E. F. (1997). Creating false memories. *Scientific American, 277,* 70–75. Retrieved from http://faculty.washington.edu/eloftus/Articles/sciam.htm.

Loftus, E. F. (1997a, September). Creating false memories. *Scientific American, 227,* 70–75.

Loftus, E. F. (1997b). Memory for a past that never was. *Current Directions in Psychological Science, 6,* 60–65.

Loftus, E. F. (2003b). Our changeable memories: Legal and practical implications. *Nature Reviews: Neuroscience, 4,* 231–234.

Loftus, E. F., & Ketcham, K. (1994). *The myth of repressed memory: False memories and allegations of sexual abuse.* New York, NY: St. Martin's Griffin. [See also: Loftus, 1993; Ofshe & Watters, 1994]

Loftus, E. F., & Klinger, M. R. (1992). Is the unconscious smart or dumb? *American Psychologist, 47,* 761–765.

Loftus, E. F., & Palmer, J. C. (1973). Reconstruction of automobile destruction: An example of the interaction between language and memory. *Journal of Verbal Learning and Verbal Behavior, 13,* 585–589.

Lonner, W. J., & Malpass, R. (1994). *Psychology and culture.* Boston, MA: Allyn & Bacon.

Lourenço, O., & Machado, A. (1996). In defense of Piaget's theory: A reply to 10 common criticisms. *Psychological Review, 103,* 143–164.

Lovibond, S. H., Adams, M., & Adams, W. G. (1979). The effects of three experimental prison environments on the

behavior of nonconflict volunteer subjects. *Australian Psychologist, 14,* 273–285.

Luborsky, L., Singer, B., & Luborsky, L. (1975). Comparative studies of psycho therapies: Is it true that everyone has won and all must have prizes? *Archives of General Psychiatry, 32,* 995–1008.

Luhrmann, T. M., Padmavati, R., Tharoor, H., & Osei, A. (2015). Differences in voice-hearing experiences of people with psychosis in the USA, India and Ghana: interview-based study. *British Journal of Psychiatry, 206*(1), 41–44. doi: 10.1192/bjp.bp.113.139048

Lutz, C. (1988). *Unnatural emotions.* Chicago, IL: University of Chicago Press.

Lykken, D., & Tellegen, A. (1996). Happiness is a stochastic phenomenon. *Psychological Science, 7,* 186–189.

Lykken, D. T., McGue, M., Tellegen, A., & Bouchard, T. J. (1992). Emergenesis: Genetic traits that may not run in families. *American Psychologist, 47,* 1565–1577.

Lytton, H., & Romney, D. M. (1991). Parents' differential socialization of boys and girls: A meta-analysis. *Psychological Bulletin*, *109*, 267–296.

Lyubomirsky, S. (2007). *The how of happiness: A scientific approach to getting the life you want.* New York, NY: Penguin Press.

Lyubomirsky, S., & Boehm, J. K. (2010). Human motives, happiness, and the puzzle of parenthood: Commentary on Kenrick et al. (2010). *Perspectives on Psychological Science, 5*, 327–334. [See also: Person & Park, 2010.]

Maas, J. B. (1999). *Power sleep: The revolutionary program that prepares your mind for peak performance.* New York, NY: HarperPerennial.

Maccoby, E. (1998). *The two sexes: Growing up apart, coming together.* Cambridge, MA: Belknap Press.

Maccoby, E. (2000). *Gender differentiation in childhood: Broad patterns and their implications.* Address given at the American Psychological Association annual convention, Washington, DC.

Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent–child interaction. In E. M. Hetherington (Ed.), *Handbook of child psychology: Vol. 4, Socialization, personality, and social development* (4th ed., pp. 1–101). New York, NY: Wiley.

Maccoby, N., Farquhar, J. W., Wood, P. D., & Alexander, J. K. (1977). Reducing the risk of cardiovascular disease: Effects of a community-based campaign on knowledge and behavior. *Journal of Community Health, 3,* 100–114.

MacCoun, R. J. (1998). Toward a psychology of harm reduction. *American Psychologist, 53,* 1199–1208.

Macknik, S. L., & Martinez-Conde, S. (2014, January/February). Filling in the _____: Your brain fills in all kinds of visual gaps. *Scientific American Mind, 25*(1), 21–23.

Macmillan, J. C. (2000). *An odd kind of fame: Stories of Phineas Gage.* Cambridge, MA: MIT Press.

Macrae, C. N., Milne, A. B., & Bodenhausen, G. V. (1994). Stereotypes as energy-saving devices: A peek inside the cognitive toolbox. *Journal of Personality and Social Psychology, 66,* 37–47.

Maddi, S. R. (1987). Hardiness training at Illinois Bell Telephone. In J. P. Opatz (Ed.), *Health promotion evaluation* (pp. 101–115). Stevens Point, WI: National Wellness Institute.

Maddi, S. R. (2002). The story of hardiness: Twenty years of theorizing, research and practice. *Consulting Psychology Journal, 54,* 173–185.

Maddi, S. R. (2006). Hardiness: The courage to grow from stresses. *Journal of Positive Psychology, 1* (3), 160–168.

Maddi, S. R., Harvey, R. H., Khoshaba, D. M., Fazel, M., & Resurreccion, N. (2009). Hardiness training facilitates performance in college. *Journal of Positive Psychology, 4,* 566–577.

Maddi, S. R., Kahn, S., & Maddi, K. L. (1998). The effectiveness of hardiness training. *Consulting Psychology Journal, 50,* 78–86.

Maddi, S. R., & Khoshaba, D. M. (2005). *Resilience at work: How to succeed no matter what life throws at you.* New York, NY: Amacom.

Maddi, S. R., & Kobasa, S. C. (1984). *The hardy executive: Health under stress.* Homewood, IL: Dow Jones-Irwin.

Maddi, S. R., Matthews, M. D., Kelly, D. R., Villarreal, B., & White, M. (2012). The role of hardiness and grit in predicting performance and retention of USMA cadets. *Military Psychology, 24* (1), 19–28.

Maglione, M. A., Das, L., Raaen, L., Smith, A., Chari, R., Newberry, S., . . . Gidengil C. (2014). Safety of vaccines used for routine immunization of U.S. children: a systematic review. *Pediatrics, 134*(2), 325–337. doi:10.1542/peds.2014-1079

Maguire, E. A., Spiers, H. J., Good, C. D., Hartley, T., Frackowiak, R. S., & Burgess, N. (2003). Navigation expertise and the human hippocampus: A structural brain imaging analysis. *Hippocampus, 13,* 250–259.

Maher, B. A., & Maher, W. B. (1985). Psychopathology: II. From the eighteenth century to modern times. In G. A. Kimble & K. Schlesinger (Eds.), *Topics in the history of psychology* (Vol. 2, pp. 295–329). Hillsdale, NJ: Erlbaum.

Maier, S. F., & Watkins, L. R. (1999). Bidirectional communication between the brain and the immune system: Implications for behaviour. *Animal Behaviour, 57,* 741–751.

Maier, S. F., & Watkins, L. R. (2000). The immune system as a sensory system: Implications for psychology. *Current Directions in Psychological Science, 9,* 98–102.

Maisto, S. A., Galizio, M., & Connors, G. J. (1995). *Drug use and abuse* (2nd ed.). Fort Worth, TX: Harcourt Brace.

Makin, S. (2014, January/February). A unified theory of depression. *Scientific American Mind, 25*(1), 14.

Malatesta, V. J., Sutker, P. B., & Treiber, F. A. (1981). Sensation seeking and chronic public drunkenness. *Journal of Consulting and Clinical Psychology, 49,* 282–294.

Malitz, S., & Sackheim, H. A. (1984). Low dosage ECT: Electrode placement and acute physiological and cognitive effects. *American Journal of Social Psychiatry, 4,* 47–53.

Manfredi, M., Bini, G., Cruccu, G., Accor nero, N., Beradelli, A., & Medolago, L. (1981). Congenital absence of pain. *Archives of Neurology, 38,* 507–511.

Mann, T., Tomiyama, A. J., Westling, E., Lew, A., Samuels, B., & Chatman, J. (2007). Medicare's search for effective obesity treatments: Diets are not the answer. *American Psychologist, 62,* 220–233.

Manning, R., Levine, M., & Collins, A. (2007). The Kitty Genovese murder and the social psychology of helping. *American Psychologist, 62*, 555–562.

Maquet, P. (2001, November 2). The role of sleep in learning and memory. *Science, 294,* 1048–1052.

Marcotty, J. (2010, September 22). "Savior sibling" raises a decade of life-and-death questions. *Star Tribune*. Retrieved from Center for Genetics and Society www.geneticsandsociety.org/article.php?id=5388

Marcus, G. B. (1986). Stability and change in political attitudes: Observe, recall, and "explain." *Political Behavior, 8,* 21–44.

Marcus, G. F. (1996). Why do children say "breaked"? *Current Directions in Psychological Science, 3,* 81–85.

Markman, H. J., & Notarius, C. I. (1993). *We can work it out.* Berkeley, CA: Berkeley Publishing Group.

Marks, J. (2004, June). Ask *Discover:* How closely related are people to each other? And how closely does our genome match up with those of other primates? *Discover, 25*(6), 17.

Markus, H. R., & Kitayama, S. (1994). The cultural construction of self and emotion: Implications for social behavior. In H. R. Markus & S. Kitayama (Eds.), *Emotion and culture: Empirical studies of mutual influence* (pp. 89–130). Washington, DC: American Psychological Association.

Markus, H. R., Uchida, Y., Omoregie, H., Townsend, S. S. M., & Kitayama, S. (2006). Going for the gold: Models of agency in Japanese and American contexts. *Psychological Science, 17,* 103–112.

Marshall, E. (2000, August 4). Duke study faults overuse of stimulants for children. *Science, 289,* 721.

Marschall, J. (2007, February/March). Seduced by sleep. *Scientific American Mind, 18*(1), 52–57.

Marsh, H. W., Hau, K. T., Sung, R. Y. T., & Yu, C. W. (2007). Childhood obesity, gender, actual–ideal body image discrepancies, and physical self-concept in Hong Kong children: Cultural differences in the value of moderation. *Developmental Psychology, 43,* 647–662.

Marsh, P. (1988). Detecting insincerity. In P. Marsh (Ed.), *Eye to eye: How people interact.* (Ch. 14, pp. 116–119). Oxford, England: Oxford Andromeda.

Martin, D. J., Garske, J. P., & Davis, M. K. (2000). Relation of the therapeutic alliance with outcome and other variables: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 68,* 438–450.

Martin, G., & Pear, J. (1999). *Behavior modification: What it is and how to do it* (6th ed.). Upper Saddle River, NJ: Prentice Hall.

Martin, J. A. (1981). A longitudinal study of the consequences of early mother–infant interaction: A microanalytic approach. *Monographs of the Society for Research in Child Development, 46* (203, Serial No. 190).

Martinez-Conde, S., & Macknik, S. L. (2008, December). Magic and the brain. *Scientific American, 299*(6), 72–79.

Martinez-Conde, S., & Macknik, S. L. (2011, November/December). Shifting focus. *Scientific American Mind, 22*(5), 48–55.

Martins, Y., Preti, G., Crabtree, C. R., Runyan, T., Vainius, A. A., & Wysocki, C. J. (2005). Preference for human body odors is influenced by gender and sexual orientation. *Psychological Science, 16,* 694–701.

Maruyama, G., & Miller, N. (1975). *Physical attractiveness and classroom acceptance (Research Report 75–2).* Los Angeles: University of Southern California, Social Science Research Institute.

Marx, J. (2004, July 16). Prolonging the agony. *Science, 305,* 326–329.

Marx, J. (2005). Preventing Alzheimer's: A lifelong commitment? *Science, 309,* 864–866.

Marx, J. (2006, January 20). Drugs inspired by a drug. *Science, 311,* 322–325.

Maslach, C. (1982). *Burnout: The cost of caring*. Englewood Cliffs, NJ: Prentice-Hall.

Maslach, C. (1998, April). *The truth about burn-out*. The G. Stanley Hall Lecture given at the Western Psychological Association convention in Albuquerque, NM.

Maslach, C. (2003). Job burnout: New directions in research and intervention. *Current Directions in Psychological Science, 12,* 189–192.

Maslach, C., & Goldberg, J. (1998). Prevention of burnout: New perspectives. *Applied and Preventive Psychology, 7,* 63–74.

Maslach, C., & Leiter, M. P. (1997). *The truth about burnout: How organizations cause personal stress and what to do about it.* San Francisco, CA: Jossey-Bass Publishers.

Maslach, C., & Leiter, M. P. (2005). Stress and burnout: The critical research. In C. L. Cooper (Ed.), *Handbook of stress medicine and health* (2nd ed., pp. 153–170). Boca Raton, FL: CRC Press LLC.

Maslach, C., & Leiter, M. P. (2008). Early predictors of job burnout and engagement. *Journal of Applied Psychology, 93,* 498–512.

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology, 52,* 397–422.

Maslow, A. (1943). A theory of human motivation. *Psychological Review, 50,* 370–396. Retrieved from http://psychclassics. yorku.ca/Maslow/motivation.htm.

Maslow, A. H. (1968). *Toward a psychology of being* (2nd ed.). New York, NY: Van Nostrand.

Maslow, A. H. (1970). *Motivation and personality* (Rev. ed.). New York, NY: Harper & Row.

Maslow, A. H. (1971). *Farther reaches of human nature.* New York, NY: Viking Penguin.

Mason, M. F., Norton, M. I., Van Horn, J. D., Wegner, D. M., Grafton, S. T., & Macrae, C. N. (2007, January 19). Wandering minds: The default network and stimulus-independent thought. *Science, 315,* 393–395.

Massimini, M., Ferrarelli, F., Huber, R., Esser, S. K., Singh, H., & Tononi, G. (2005, September 30). Breakdown of cortical effective connectivity during sleep. *Science, 309,* 2228–2232. [See also: Miller, 2005; Roser & Gazzaniga, 2004.]

Masten, A. S. (2001). Ordinary magic: Resilience processes in development. *American Psychologist, 56,* 227–238.

Masters, W. H., & Johnson, V. E. (1966). *Human sexual response.* Boston, MA: Little, Brown.

Masters, W. H., & Johnson, V. E. (1970). *Human sexual inadequacy.* Boston, MA: Little, Brown.

Masters, W. H., & Johnson, V. E. (1979). *Homo sexuality in perspective.* Boston, MA: Little, Brown.

Matarazzo, J. D. (1980). Behavioral health and behavioral medicine: Frontiers for a new health psychology. *American Psychologist, 35,* 807–817.

Mather, M. (2007). Emotional arousal and memory binding: An object-based framework. *Perspectives on Psychological Science, 2,* 33–52.

Matossian, M. K. (1982). Ergot and the Salem witchcraft affair. *American Scientist, 70,* 355–357.

Matossian, M. K. (1989). *Poisons of the past: Molds, epidemics, and history.* New Haven, CT: Yale University Press.

Matson, J. L., & Boisjoli, J. A. (2009). The token economy for children with intellectual disability and/or autism: A review. *Research in Developmental Disabilities, 30*(2), 240–248.

Matsumoto, D. (1994). *People: Psychology from a cultural perspective.* Pacific Grove, CA: Brooks/Cole.

Matsumoto, D. (1996). *Culture and psychology.* Pacific Grove, CA: Brooks/Cole. [See also: Jenkins, 1994; Manson, 1994]

Matthews, K. A. (1982). Psychological perspectives on the Type-A behavior pattern. *Psychological Bulletin, 91,* 293–323.

Matthews, K. A., Woodall, K. L., Kenyon, K., & Jacob, T. (1996). Negative family environment as a predictor of boys'

future status on measures of hostile attitudes, interview behavior, and anger expression. *Health Psychology, 15,* 30–37.

Mauron, A. (2001, February 2). Is the genome the secular equivalent of the soul? *Science, 291,* 831–833.

Max Planck Institute for Human Development, and Stanford Center on Longevity. (2014, October 20). *A consensus on the brain training industry from the scientific community.* Retrieved from http://longevity3.stanford.edu/blog/2014/10/15/the-consensus-on-the-brain-training-industry-from-the-scientific-community/

May, R. (1996). *The meaning of anxiety.* New York, NY: Norton.

Mayberg, H. S. (2006). Defining neurocircuits in depression. *Psychiatric Annals, 36,* 259–268.

Mayberg, H. S. (2009). Targeted electrode-based modulation of neural circuits for depression. *Journal of Clinical Investigation, 119,* 717–725. Retrieved from www.jci.org/articles/view/38454.

Mayberg, H. S., Lozano, A. M., Voon, V., McNeely, H. E., Seminowicz, D., Hamani, C., . . . Kennedy, S. H. (2005, March 3). Deep brain stimulation for treatment-resistant depression. *Neuron, 45,* 651–660.

Mayberry, R. I. (1991). The importance of childhood to language acquisition: Evidence from American Sign Language. In J. C. Goodman & H. C. Nusbaum (Eds.). *The development of speech perception: The transition from speech sounds to spoken words* (pp. 57–90) Cambridge, MA: MIT Press.

Mayer, J. D. (1999, September). Emotional intelligence: Popular or scientific psychology? *American Psychological Association Monitor, 50.*

Mayer, J. D., Salovey, P., & Caruso, D. R. (2008). Emotional intelligence: new ability or eclectic traits? *American Psychologist, 63*(6), 503–517.

Mayr, E. (2000, July). Darwin's influence on modern thought. *Scientific American, 283*(1), 79–83.

Mbadiwe, T., & Millis, R. M. (2013). Epigenetics and autism. *Autism Research and Treatment, 2013,* 826156. doi: 1155/2013/826156

McAdams, D. P. (1992). The five-factor model in personality: A critical appraisal. *Journal of Personality, 60,* 239–361.

McAdams, D. P. (2006). *The redemptive self: Stories Americans live by.* New York, NY: Oxford University Press.

McAdams, D. P., & Pals, J. L. (2006). A new Big Five: Fundamental principles for an integrative science of personality. *American Psychologist, 61,* 204–217.

McAdams, D. P., de St. Aubin, E., & Logan, R. L. (1993). Generativity among young, midlife, and older adults. *Psychology and Aging, 8,* 221–230.

McAnulty, R. D., & Burnette, M. M. (2004). *Exploring human sexuality: Making healthy decisions* (2nd ed.). Boston, MA: Allyn & Bacon.

McArdle, J. J., Ferrer-Caja, E. Hamagami, F., & Woodcock, R. W. (2002). Comparative longitudinal structural analyses of the growth and decline of multiple intellectual abilities over the life span. *Develop mental Psychology, 38,* 115–142.

McCann, I. L., & Holmes, D. S. (1984). Influence of aerobic exercise on depression. *Journal of Personality and Social Psychology, 46,* 1142–1147.

McCann, I. L., & Pearlman, L. A. (1990). Vicarious traumatization: A framework for understanding the psychological effects of working with victims. *Journal of Traumatic Stress, 3,* 131–149.

McCarley, N., & Carskadon, T. G. (1983). Test–retest reliabilities of scales and subscales of the Myers–Briggs Type Indicator and of criteria for clinical interpretive hypotheses involving them. *Research in Psychological Type, 6,* 24–36.

McCarthy, K. (1991, August). Moods—good and bad—color all aspects of life. *APA Monitor,* 13.

McCartney, K., Harris, M. J., & Bernieri, F. (1990). Growing up and growing apart: A developmental meta-analysis of twin studies. *Psychological Bulletin, 107,* 226–237.

McClearn, G. E., Johansson, B., Berg, S., Pedersen, N. L., Ahern, F., Petrill, S. A., & Plomin, R. (1997, June 6). Substantial genetic influence on cognitive abilities in twins 80 or more years old. *Science, 276,* 1560–1563.

McClelland, D. C. (1958). Methods of measuring human motivation. In J. W. Atkinson (Ed.), *Motives in fantasy, action and society.* Princeton, NJ: D. Van Nostrand.

McClelland, D. C. (1965). Achievement and entrepreneurship: A longitudinal study. *Journal of Personality and Social Psychology, 1,* 389–392.

McClelland, D. C. (1975). *Power: The inner experience.* New York, NY: Irvington.

McClelland, D. C. (1985). *Human motivation.* New York, NY: Scott Foresman.

McClelland, D. C. (1987a). Characteristics of successful entrepreneurs. *The Journal of Creative Behavior, 21,* 219–233.

McClelland, D. C. (1987b). *Human motivation.* New York, NY: Cambridge University Press. [See also: Cooper, 1983; French & Thomas, 1958]

McClelland, D. C. (1993). Intelligence is not the best predictor of job performance. *Current Directions in Psychological Science, 2,* 5–6.

McClelland, D. C., & Boyatzis, R. E. (1982). Leadership motive pattern and long-term success in management. *Journal of Applied Psychology, 67,* 737–743.

McClintock, M. (1971, January 22). Menstrual synchrony and suppression. *Nature, 229,* 244–245.

McClure, S. M., Laibson, D. I., Loewenstein, G., & Cohen, J. D. (2004). Separate neural systems value immediate and delayed monetary rewards. *Science, 306,* 503–507.

McCook, A. (2006, July 24). Conflicts of interest at federal agencies. *TheScientist.com.* Retrieved from www.the-scientist.com/news/display/24056/.

McCrae, R. R., Terraciano, A., & 78 members of the Personality Profiles of Cultures Project. (2005). Universal features of personality traits from the observer's perspective: Data from 50 cultures. *Journal of Personality and Social Psychology, 88,* 547–561.

McCullough, M. L. (2001). Freud's seduction theory and its rehabilitation: A saga of one mistake after another. *Review of General Psychology, 5,* 3–22.

McDonald, K. A. (1998, August 14). Scientists consider new explanations for the impact of exercise on mood. *The Chronicle of Higher Education,* A15–A16.

McGaugh, J. L. (2000, January 14). Memory—A century of consolidation. *Science, 287,* 248–251.

McGlone, M. S., & Aronson, J. (2006). Stereotype threat, identity salience, and spatial reasoning. *Journal of Applied Developmental Psychology, 27,* 486–493.

McGowan, P. O., Sasaki, A., D'Alessio, A. C., Dymov, S., Labonte, B., Szyf, M., . . . Meaney, M. J. (2009). Epigenetic regulations of the glucocorticoid receptor in human brain associates with childhood abuse. *Nature Neuroscience, 12*(3), 342–348. doi:10.1038/nn.2270

McGuire, P. A. (2000, February). New hope for people with schizophrenia. *Monitor on Psychology, 31*(2), 24–28.

McGurk, S. R., Mueser, K. T., Feldman, K., Wolfe, R., & Pascaris, A. (2007). Cognitive training for supported employment: 2–3 year outcomes of a randomized controlled trial. *American Journal of Psychiatry, 164,* 437–441. [See also: Butcher et al., 2008]

McHugh, R. K. & Barlow, D. (2010). The dissemination and implementation of evidence-based psychological treatments: A review of current efforts. *American Psychologist, 65,* 73–84.

McIntosh, D. N., Silver, R. C., Wortman, C. B. (1993). Religion's role in adjustment to a negative life event: Coping with the loss of a child. *Journal of Personality and Social Psychology, 65,* 812–821.

McKeachie, W. J. (1990). Research on college teaching: The historical background. *Journal of Educational Psychology, 82,* 189–200.

McKeachie, W. J. (1997). Good teaching makes a difference—and we know what it is. In R. B. Perry & J. C. Smart (Eds.), *Effective teaching in higher education: Research and practice* (pp. 396–408). New York, NY: Agathon Press.

McKeachie, W. J. (1999). *McKeachie's teaching tips: Strategies, research, and theory for college and university teachers* (10th ed.). Boston, MA: Houghton Mifflin.

McLeod, F. (2008, March 8). *Bullying affects girls far more than boys.* Retrieved from http://news.scotsman.com/ bullyingatschool/Bullying-affects-girls-far-more.3857607.jp.

McLeod, L. (2013). *Three situations that call for a Red Team.* Retrieved from http://www.mcleodandmore. com/2013/10/01/three-situations-that-call-for-a-red-team/.

McNally, R. J. (1994, August). Cognitive bias in panic disorder. *Current Directions in Psychological Science, 3,* 129–132.

McNally, R. J., Bryant, R. A., & Ehlers, A. (2003). Does early psychological intervention promote recovery from posttraumatic stress? *Psychological Science in the Public Interest, 4*(2), 45–79. doi: 10.1111/1529-1006.01421.

McNamara, P., McLaren, D., Smith, D., Brown, A., & Stickgold, R. (2005). A "Jekyll and Hyde" within: Aggressive versus friendly interactions in REM and non-REM dreams. *Psychological Science, 16,* 130–136.

Medin, C., Lynch, J., & Solomon, H. (2000). Are there kinds of concepts? *Annual Review of Psychology, 52,* 121–147.

Medin, D. L., & Ross, B. H. (1992). *Cognitive psychology.* Fort Worth, TX: Harcourt Brace Jovanovich.

Meeus, W. H. J., & Raaijmakers, Q. A. W. (1986). Administrative obedience: Carrying out orders to use psychological-administrative violence. *European Journal of Social Psychology, 16,* 311–324.

Mehl, M. R., Gosling, S. D. & Pennebaker, J. W. (2006). Personality in its natural habitat: Manifestations and implicit folk theories of personality in daily life. *Journal of Personality and Social Psychology, 90,* 862–877.

Meichenbaum, D. H., & Cameron, R. (1974). The clinical potential and pitfalls of modifying what clients say to themselves. In M. J. Mahoney & C. E. Thoreson (Eds.), *Self-control: Power to the person* (pp. 263–290). Monterey, CA: Brooks-Cole.

Meier, R. P. (1991). Language acquisition by deaf children. *American Scientist, 79,* 60–70.

Meltzoff, A. N., & Moore, M. K. (1983). Newborn infants imitate adult facial gestures. *Child Development 54,* 702–709.

Meltzoff, A. N., & Moore, M. K. (1989). Imitation in newborn infants: exploring the range of gestures imitated and the underlying mechanism. *Developmental Psychology 25,* 954–962.

Meltzoff, J., & Kornreich, M. (1970). *Research in psychotherapy.* New York, NY: Atherton.

Melzack, R. (1990, February). The tragedy of needless pain. *Scientific American, 262,* 27–33.

Melzack, R., & Wall, P. D. (1965). Pain mechanisms: A new theory. *Science, 150,* 971–979.

Melzack, R., & Wall, P. D. (1983). *The challenge of pain.* New York, NY: Basic Books.

Merari, A. (2006). Psychological aspects of suicidal terrorism. In B. Bongar, L. M. Brown, L. Beutler, J. N. Breckenridge, & P. G. Zimbardo (Eds.), *Psychology and terrorism,* (pp. 101–115). New York, NY: Oxford University Press.

Mercado, C. C. (2006, November). Expert testimony in insanity cases. *Monitor on Psychology, 37*(10), 58. Meredith, N. (1986, June). Testing the talking cure. *Science 86,* 7, 30–37.

Merikangas, K.R., Jin, R., He, J., Kessler, R.C., Lee, S., Sampson, N. A., . . . Zarkov, Z. (2011). Prevalence and correlates of bipolar spectrum disorder in the world mental health survey initiative. *Archives of General Psychiatry, 68*(3), 241–251. doi:10.1001/archgenpsychiatry.2011.12.

Merikle, P. M., & Reingold, E. M. (1990). Recognition and lexical decision without detection: Unconscious perception? *Journal of Experimental Psychology: Human Perception & Performance, 16,* 574–583.

Mervis, C. B., & Rosch, E. (1981). Categorization of natural objects. *Annual Review of Psychology, 32,* 89–115.

Meston, C. M., & Buss, D. M. (2009). *Why women have sex: The psychology of sex in women's own voices.* New York, NY: Times Books.

Meyer-Lindenberg, A. (2008, August 8). Trust me on this. *Science, 321,* 778–780.

Meyer-Lindenberg, A. (2009, April/May). Perturbed personalities. *Scientific American Mind, 20*(2), 41–43.

Meyer, S. (n.d.). The story behind *Twilight*. In *The official website of Stephanie Meyer*. Retrieved from www.stephenie-meyer.com/twilight.html.

Meyers, L. (2006, November). Medicate or not? An APA working group reports on use of medications when treating children. *Monitor on Psychology, 37*(10), 24–25.

Meyers, L. (2007, June). Of mind and matter: Understanding consciousness. *Monitor on Psychology, 38*(6), 32–35.

Michael, R. T., Gagnon, J. H., Laumann, E. O., & Kolata, G. (1994). *Sex in America: A definitive survey.* New York, NY: Little, Brown.

Miklowitz, D. J. (2007) The role of the family in the course and treatment of bipolar disorder. *Current Directions in Psychological Science, 16,* 192–196.

Miklowitz, D. J., Otto, M. W., Frank, E., Reilly-Harrington, N. A., Wisniewski, S. R., Kogan, J. N., . . . Sachs, G. S. (2007). Psychosocial treatments for bipolar depression: A 1-year randomized trial from the systematic treatment enhancement program. *Archives of General Psychiatry, 64,* 419–426.

Milgram, S. (1965). Some conditions of obedience and disobedience to authority. *Human Relations, 18,* 56–76.

Milgram, S. (1974). *Obedience to authority.* New York, NY: Harper & Row.

Miller, C. C. (2015, May 17). Mounting evidence of advantages for children of working mothers. *New York Times*.

Miller, D. C. (1916/1922). *The science of musical sounds.* New York, NY: W. H. Freeman.

Miller, G. (2004, April 2). Learning to forget. *Science, 304,* 34–36.

Miller, G. (2005, May 13). Reflecting on another's mind. *Science, 308,* 945–946.

Miller, G. (2006a, August 4). The emotional brain weighs its options. *Science, 313,* 600–601.

Miller, G. (2006b, May 12). Probing the social brain. *Science, 312,* 838–839.

Miller, G. (2006c, January 27). The unseen: Mental illness's global toll. *Science, 311,* 458–461.

Miller, G. (2007, March 9). Hunting for meaning after midnight. *Science, 315,* 1360–1363.

Miller, G. (2008, September 5). Investigating the psychopathic mind. *Science, 321,* 1284–1286.

Miller, G. A. (1956). The magic number seven plus or minus two: Some limits in our capacity for processing information. *Psychological Review, 63,* 81–97.

Miller, K. E., Barnes, G. M., Sabo, D. F., Melnick, M. J., & Farrell, M. P. (2002). Anabolic-androgenic steroid use and other adolescent problem behaviors: Rethinking the male athlete assumption. *Sociological Perspectives, 45,* 467–489.

Miller, M. W. (1993, December 2). Dark days: The staggering cost of depression. *The Wall Street Journal,* B1.

Miller, N. E. (1983). Behavioral medicine: Symbiosis between laboratory and clinic. *Annual Review of Psychology, 34,* 1–31.

Miller, P. Y., & Simon, W. (1980). The development of sexuality in adolescence. In J. Adelson (Ed.), *Handbook of adolescent psychology.* New York, NY: Wiley.

Miller, S. L., & Maner, J. K. (2010). Scent of a woman: Men's testosterone responses to olfactory ovulation cues. *Psychological Science, 21,* 276–283. doi: 10.1177/0956797609357733.

Miller, W. R., & Brown, S. A. (1997). Why psychologists should treat alcohol and drug problems. *American Psychologist, 52,* 1269–1279.

Milner, B., Corkin, S., & Teuber, H. H. (1968). Further analysis of the hippocampal amnesic syndrome: 14-year follow-up study of H. M. *Neuropsychologia, 6,* 215–234.

Mineka, S., Davidson, M., Cook, M., & Keir, R. (1984). Observational conditioning of snake fear in rhesus monkeys. *Journal of Abnormal Psychology, 93,* 355–372.

Mineka, S., & Zinbarg, R. (2006). A contemporary learning theory perspective on the etiology of anxiety disorders: It's not what you thought it was. *American Psychologist, 61,* 10–26.

Minkel, J. R. (2009, November). Putting madness in its place. *Scientific American, 301*(5), 16, 19.

Mintz, L. B., & Betz, N. E. (1986). Sex differences in the nature, realism, and correlates of body image. *Sex Roles, 15,* 185–195.

Mischel, W. (1968). *Personality and assessment.* New York, NY: Wiley.

Mischel, W. (1973). Toward a cognitive social learning conceptualization of personality. *Psychological Review, 80,* 252–283.

Mischel, W. (1990). Personality dispositions revisited and revised: A view after three decades. In L. A. Pervin (Ed.), *Handbook of personality: Theory and research.* New York, NY: Guilford Press.

Mischel, W. (1993). *Introduction to personality* (5th ed.). Fort Worth, TX: Harcourt Brace Jovanovich College Publishers.

Mischel, W. (2003). Challenging the traditional personality psychology paradigm. In R. J. Sternberg, (Ed.), *Psychologists defying the crowd: Stories of those who battled the establishment and won* (pp. 139–156). Washington, DC: American Psychological Association.

Mischel, W. (2014). *The marshmallow test: Mastering self-control.* New York, NY: Little, Brown.

Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality: Reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review, 102,* 246–268.

Miyake, A., Kost-Smith, L. E., Finkelstein, N. D., Pollock, S. J., Cohen, G. L., & Ito, T. A. (2010). Reducing the gender achievement gap in college science: A classroom study of values affirmation. *Science, 330,* 1234–1237.

Miyake, K. (1993). Temperament, mother–infant interaction, and early emotional development. *Japanese Journal of Research on Emotions, 1,* 48–55.

Miyake, K., Cen, S., & Campos, J. J. (1985). Infant temperament, mother's mode of interaction, and attachment in Japan: An interim report. In J. Bretherton & E. Waters (Eds.), *Growing points of attachment theory: Monographs of the Society of Research in Child Development, 50* (1-2, Serial No. 209).

Miyashita, Y. (1995). How the brain creates imagery: Projection to primary visual cortex. *Science, 268,* 1719–1720.

Mizukami, K., Kobayashi, N., Ishii, T., & Iwata, H. (1990). First selective attachment begins in early infancy: A study using telethermography. *Infant Behavior and Development, 13,* 257–271.

Mobbs, D., Hagan, C. C., Azim, E., Menon, V., & Reiss, A. (2006, November). Personality predicts activity in reward and emotional regions associated with humor. *Proceedings of the National Academy of Sciences, 102,* 16, 496–416, 501.

Mobbs, D., Petrovic, P., Marchant, J. L., Hassabis, D., Weiskopf, N., Seymour, B., . . . Frith, C. D. (2007, August 24). When fear is near: Threat imminence elicits prefrontal-periaqueductal gray shifts in humans. *Science, 317,* 1079–1083. [See also: Barlow, 2000, 2001; Maren, 2007.]

Moen, P., & Wethington, E. (1999). Midlife development in a life-course context. In S. L. Willis & J. D. Reid (Eds.), *Life in the middle: Psychological and social development in middle age* (pp. 3–25). San Diego, CA: Academic Press.

Moffitt, T. E., Arseneault, L., Belsky, D., Kickson, N., Hancox, R. J., Harrington, H., . . . Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences, 108*(7), 2693–2698.

Mogelonsky, M. (1996). The rocky road to adulthood. *American Demographics, 18,* 26–36, 56.

Moghaddam, E. (2007). *Multiculturalism and intergroup relations: Psychological implications for democracy.* Washington, DC: APA Press.

Moghaddam, F. M., Taylor, D. M., & Wright, S. C. (1993). *Social psychology in cross-cultural perspective.* New York, NY: W. H. Freeman.

Molden, D. C., & Dweck, C. S. (2006). Finding "meaning" in psychology: A lay theories approach to self-regulation, social perception, and social development. *American Psychologist, 61,* 192–203.

Mombaerts, P. (1999, October 22). Seven-transmembrane proteins as odorant and chemosensory receptors. *Science, 286,* 707–711.

Monaghan, P. (1999, February 26). Lessons from the "marriage lab." *Chronicle of Higher Education,* A9.

Mones, A. G., & Schwartz, R. C. (2007). The functional hypothesis: A family systems contribution toward an understanding of the healing process of the common factors. *Journal of Psychotherapy Integration, 17,* 314–329.

Money, J. (1987). Sin, sickness, or status? Homosexual gender identity and psychoneuroendocrinology. *American Psychologist, 42,* 384–399.

Monroe, S. M., & Reid, M. W. (2009). Life stress and major depression. *Current Directions in Psychological Science, 18,* 68–72.

Monte, C. F. (1980). *Beneath the mask: An introduction to theories of personality* (2nd ed.). New York, NY: Holt, Rinehart and Winston.

Montoya, R. M., & Horton, R. S. (2013). A meta-analytic investigation of the processes underlying the similarity-attraction effect. *Journal of Social and Personal Relationships, 30*(1), 64–94.

Moore, M. K., & Meltzoff, A. M. (2004). Object permanence after a 24-hour delay and leaving the locale of disappearance: The role of memory, space, and identity. *Developmental Psychology, 40,* 606–620.

Moore-Ede, M. (1993). *The twenty-four-hour society: Understanding human limits in a world that never stops.* Reading, MA: Addison-Wesley.

Moran, C. C. (2002). Humor as a moderator of compassion fatigue. In C. R. Figley (Ed.), *Treating compassion fatigue* (pp. 139–154). New York, NY: Brunner-Routledge.

Moran, J. M., Wig, G. S., Adams, R. B., Jr., Janata, P., & Kelley, W. M. (2002). Neural correlates of humor detection and appreciation. *Neuroimage, 21,* 1055–1060.

Moreno, M. A., Goniu, N., Moreno, P. S., & Diekema, D. (2013). Ethics of social media research: Common concerns and practical considerations. *Cyberpsychology, Behavior and Social Networking, 16*(9), 708–713.

Morgan, A. H., Hilgard, E. R., & Davert, E. C. (1970). The heritability of hypnotic susceptibility of twins: A preliminary report. *Behavior Genetics, 1,* 213–224.

Morhenn, V., Beavin, L. E., & Zak, P. J. (2012). Massage increases oxytocin and reduces adrenocorticotropin hormone in humans. *Alternative Therapies in Health and Medicine, 18*(6), 11–18.

Mori, K., & Arai, M. (2010a). No need to fake it: Reproduction of the Asch experiment without confederates. *International Journal of Psychology, 45*(5), 390–397. doi: 10.1080/00207591003774485

Mori, K., & Arai, M. (2010b, December). Out of the Asch study. *The Psychologist, 23,* 960.

Mori, K., Nagao, H., & Yoshihara, Y. (1999). The olfactory bulb: Coding and processing of odor molecule information. *Science, 286,* 711–715.

Moriarity, T. (1975). Crime, commitment and the responsive bystander: Two field experiments. *Journal of Personality and Social Psychology, 31,* 370–376.

Morrell, E. M. (1986). Meditation and somatic arousal. *American Psychologist, 41*(6), 712–713. [See also: Dillbeck & Orme-Johnson, 1987; Holmes, 1984]

Morris, W. N., & Miller, R. S. (1975). The effects of consensus-breaking and consensus-preempting partners on reduction of conformity. *Journal of Experimental Social Psychology, 11,* 215–223.

Morrison-Bogorad, M., & Phelps, C. (1997, March 12). Alzheimer disease research comes of age. *JAMA: Journal of the American Medical Association, 277,* 837–840.

Moskowitz, C. (2009). Teen brains clear out childhood thoughts. *LiveScience,* March 23, 2009. Retrieved from www.livescience.com/3435-teen-brains-clear-childhood-thoughts.html.

Moss, R. (1996). *Conscious dreaming: A spiritual path to everyday life.* New York, NY: Crown Publishing.

Mowrer, O. H., & Mowrer, W. M. (1938). Enuresis— a method for its study and treatment. *American Journal of Orthopsychiatry, 8,* 436–459.

Moyer, M. W. (2011, May/June). Obsessions revisited. *Scientific American Mind,* 37–41.

Mroczek, D. K. (2001). Age and emotion in adulthood. *Current Directions in Psychological Science, 10,* 87–90.

MTA Cooperative Group. (1999). A fourteen-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. *Archives of General Psychiatry, 56,* 1073–1086.

MTA Cooperative Treatment Group. (2004). National Institute of Mental Health Multimodal Treatment Study of ADHD follow-up: 24-month outcomes of treatment strategies for attention-deficit/hyperactivity disorder. *Pediatrics, 113,* 754–761.

Mueser, K. T., & McGurk, S. R. (2004, June 19). Schizophrenia. *Lancet, 363,* 2063–2072. doi: 10.1016/S0140-6736(04)16458-1

Muhle R., Trentacoste S. V., & Rapin, I. (2004). The genetics of autism. *Pediatrics, 113*(5), 472–486.

Mukerjee, M. (1995, October). Hidden scars: Sexual and other abuse may alter a brain region. *Scientific American, 273*(4), 14, 20.

Munakata, Y., McClelland, J. L., Johnson, M. H., & Siegler, R. S. (1997). Rethinking infant knowledge: Toward an adaptive process account of successes and failures in object permanence tasks. *Psychological Review, 104,* 686–713.

Muñoz, R. F., Beardslee, W. R., & Leykin, Y. (2012, May–June). Major depression can be prevented. *American Psychologist, 67*(4), 285–295. http://dx.doi.org/10.1037/a0027666

Munroe, R. L. (1955). *Schools of psychoanalytic thought.* New York, NY: Dryden.

Munsey, C. (2006, July/August). Frisky, but more risky. *Monitor on Psychology, 37*(7), 40–42.

Munsey, C. (2007). Armor for the mind. *Monitor on Psychology, 38.*

Munsey, C. (2009, October). Insufficient evidence to support sexual orientation change efforts. *Monitor on Psychology, 40*(9), 29.

Munsey, C. (2011, December). In the (hearing) loop. *Monitor on Psychology, 42*(11), 58–61.

Murphy, D. L., Timpano, K. R., Wheaton, M. G., Greenberg, B. D., & Miguel, E. C. (2010). Obsessive-compulsive disorder and its related disorders: a reappraisal of obsessive-compulsive spectrum concepts. *Dialogues in Clinical Neuroscience, 12*(2), 131–148.

Muro, A., Castellà, J., Sotoca, C., Estaún, S., Valero, S., & Gomà-i-Freixanet, M. (2015). To what extent is personality associated with time perspective? *Anales de Psicologia, 31*(2), 488-493.

Murphy, G., & Murphy, L. B. (Eds.). (1968). *Asian psychology.* New York, NY: Basic Books.

Murphy, J. M. (1976, March 12). Psychiatric labeling in cross-cultural perspective. *Science, 191,* 1019–1028.

Murray, B. (1995, October). Americans dream about food, Brazilians dream about sex. *APA Monitor,* 30.

Murray, B. (2002, June). Writing to heal. *APA Monitor,* 54–55.

Murray, H. A. (1938). *Explorations in personality.* New York, NY: Oxford University Press.

Murray, J. P., & Kippax, S. (1979). Children's social behavior in three towns with differing television experience. *Journal of Communication, 28,* 19–29.

Mustanski, B., Birkett, M., Greene, G. J., Rosario, M., Bostwick, W., & Everett, B. G. (2013). The association between sexual orientation identity and behavior across race/ethnicity, sex, and age in a probability sample of high school students. *American Journal of Public Health, 104*(2), 237–244.

Muthukrishna, M., Morgan, T. J. H., & Joseph Henrich, J. (in press). The when and who of social learning and conformist transmission. *Evolution and Human Behavior*. doi: 10.1016/j.evolhumbehav.2015.05.004

Myers, D. G. (2000). The funds, friends, and faith of happy people. *American Psychologist, 55,* 56–67.

Myers, D. G. (2002). *Intuition: Its powers and perils.* New Haven, CT: Yale University Press.

Myers, D. G., & Diener, E. (1995). Who is happy? *Psychological Science, 6,* 10–19.

Myers, I. B. (1998). *Introduction to Type®* (6th ed.). Mountain View, CA: CPP, Inc.

Myers, I. B., & Myers, P. B. (1995). *Gifts differing: Understanding personality type.* Palo Alto, CA: Consulting Psychologists Press. [See also: Myers, 1962, 1976, 1987.]

Myers, R. S., & Roth, D. L. (1997). Perceived benefits of and barriers to exercise and stage of exercise adoption in young adults. *Health Psychology, 16,* 277–283.

The mysteries of twins. (1998, January 11). *The Washington Post.* Retrieved from www.washingtonpost.com/wpsrv/national/longterm/twins/twins2.htm.

Nachson, I., & Zelig, A. (2003). Flashbulb and factual memories: The case of Rabin's assassination. *Applied Cognitive Psychology, 17,* 519–531.

Nahemow, L., & Lawton, M. P. (1975). Similarity and propinquity in friendship formation. *Journal of Personality and Social Psychology, 32,* 205–213.

Naigles, L. (1990). Children use syntax to learn verb meanings. *Child Language, 17,* 357–374.

Naigles, L. G., & Kako, E. T. (1993). First contact in verb acquisition: Defining a role for syntax. *Child Development, 64,* 1665–1687.

Naik, G. (2009, February 12). A baby, please. Blond, freckles—and hold the colic. *Wall Street Journal*. Retrieved from Center for Genetics and Society www.geneticsandsociety.org/article.php?id=4519.

Nairne, J. S. (2003). Sensory and working memory. In A. F. Healy and R. W. Proctor (eds.), *Handbook of Psychology, Volume 4: Experimental Psychology.* New York, NY: Wiley.

Nairne, J. S. (2009). *Psychology* (5th ed.). Belmont, CA: Thomson.

Nakamura, D. (2014, December 30). Marcus Mariota inspires Hawaiians with Heisman Trophy and off-field conduct. *Washington Post*. Retrieved from http://www.washingtonpost.com/sports/marcus-mariota-inspires-hawaiians-with-heisman-trophy-and-off-field-conduct/2014/12/30/901f47be-8e12-11e4-8ff4-fb93129c9c8b_story.html

Nantais, K. M., & Schellenberg, E. G. (1999). The Mozart effect: An artifact of preference. *Psycho logical Science, 10,* 370–373.

Napier, A. Y. (2000). Making a marriage. In W. C. Nichols, M. A. Pace-Nichols, D. S. Becvar, & A. Y. Napier (Eds.), *Handbook of family development and intervention* (pp. 145–170). New York, NY: Wiley.

Naqvi, N., Shiv, B., & Beehara, A. (2006). The role of emotion in decision making: a cognitive neuroscience perspective. *Current Directions in Psychological Science, 15*(5), 260–264.

Nash, M. R. (2001, July). The truth and the hype of hypnosis. *Scientific American, 285,* 46–49, 52–55.

Nash, M. R., & Tasso, A. (2010). The effectiveness of hypnosis in reducing pain and suffering among women with metastatic breast cancer and among women with temporomandibular disorder. *International Journal of Clinical and Experimental Hypnosis, 58*(4), 497–504.

National Academies of Science. (2003). *The polygraph and lie detection.* Washington, DC: National Academies Press.

NICHD Early Child Care Research Network. (2000). The relation of child care to cognitive and language development. *Child Development, 71,* 960–980.

NICHD Early Child Care Research Network. (2003). Does quality of child care affect child outcomes at age 4 1/2? *Developmental Psychology, 39,* 451–469.

NICHD Early Child Care Research Network. (2007). Age of entry to kindergarten and children's academic and socioemotional development. *Early Education & Development, 18*(2), 337–368.

National Institute of Medicine. (2006). *Sleep disorders and sleep deprivation: an unmet public health problem.* Retrieved from www.iom.edu/CMS/3740/23160/33668.aspx

National Institute of Mental Health (NIMH). (2003, December 22). *Mental illness genetics among science's top "breakthroughs" for 2003.* Retrieved February 6, 2008, from www.nimh.nih.gov/science-news/2003/mental-illness-genetics-among-sciences-top-breakthroughs-for-2003.shtml [See also: Plomin, 2003.]

National Institute of Mental Health (NIMH). (2005, April 21). *Brain scans reveal how gene may boost schizophrenia risk.* Retrieved from www.nimh.nih.gov/science-news/2005/brain-scans-reveal-how-gene-may-boost-schizophrenia-risk.shtml

National Institute of Mental Health (NIMH). (2006, January). *Statistics. Questions and answers about the NIMH sequenced treatment alternatives to relieve depression (STAR*D) study—Background.* Retrieved from www.nimh.nih.gov/health/trials/practical/stard/questions-and-answers-about-the-nimh-sequenced-treatment-alternatives-to-relieve-depression-stard-study-background.shtml

National Institute of Mental Health (NIMH). (2008a, April 3). *Anxiety disorders.* Retrieved from http://nimh.nih.gov/health/publications/anxiety-disorders/complete-publication.shtml#pub7

National Institute of Mental Health (NIMH). (2008b, February). *Schizophrenia*. Retrieved from www.nimh.nih.gov/health/publications/schizophrenia/summary.shtml [See also: Javitt & Coyle, 2004; Sawa & Snyder, 2002.]

National Institute of Mental Health (NIMH). (2008c, February). *Statistics*. Retrieved from www.nimh.nih.gov/statistics/index.shtml.

National Institute of Mental Health (NIMH). (2010a). *Major depressive disorder among adults*. Retrieved from www.nimh.nih.gov/statistics/1MDD_ADULT.shtml.

National Institute of Mental Health (NIMH). (2010b). *Statistics*. Retrieved from www.nimh.nih.gov/statistics/index.shtml

National Institute of Mental Health, MTA Cooperative Group. (2004). National Institute of Mental Health multimodal treatment study of ADHD follow-up: Changes in effectiveness and growth after the end of treatment. *Pediatrics, 113,* 762–769.

National Institute of Neurological Disorders and Stroke (NINDS). (2007, February). *Coma and persistent vegetative state information page*. Retrieved from www.ninds.nih.gov/disorders/coma/coma.htm

National Institute on Aging. (2004). *Alzheimer's disease education & referral center.* Retrieved from www.alzheimers.org/generalinfo.htm

National Institute on Aging. (2010). *Alzheimer's disease medications fact sheet.* Retrieved from www.nia.nih.gov/Alzheimers/Publications/medicationsfs.htm

National Institutes of Health. (2011). *Multiple sclerosis: Hope through research*. Retrieved from www.ninds.nih.gov/disorders/multiple_sclerosis/detail_multiple_sclerosis.htm.

National Institutes of Health. (2012). Go4Life: Fitness for Baby Boomers On Up. *NIH Medline Plus: The Magazine, 7.*

National Institutes of Health. (2014). Cochlear implants. (NIH Publication No. 11-4798.) Retrieved from http://www.nidcd.nih.gov/health/hearing/pages/coch.aspx

National Prevention Council. (n.d). *National Prevention Strategy: Active Living.* Retrieved from http://www.surgeongeneral.gov/initiatives/prevention/strategy/active-living.pdf

National Public Radio. (2003a, August 19). Interview: Kenneth Kendler on study about severity of depression depends on the cause. *Morning Edition.*

National Safety Council. (2013). *Understanding the distracted brain: Why driving while using hands-free cell phones is risky behavior.* Retrieved from http://www.nsc.org/learn/NSC-Initiatives/Pages/distracted-driving-research-studies.aspx

Naugle, D. A., & Hornik, R. C. (2014). Systematic review of the effectiveness of mass media interventions for child survival in low- and middle-income countries. *Journal of Health Communication, 19*(1), 190–215.

Neal, D. (Producer). (2000, September 20). [Television broadcast of Olympic Games]. New York, NY: NBC. [As cited in Markus et al., 2006]

Nedeltcheva, A.V., Kilkus, J.M., Imperial, J., Kasza, K., Schoeller, D.A., & Penev, P.D. (2009). Sleep curtailment is accompanied by increased intake of calories from snacks. *American Journal of Clinical Nutrition, 89*(1), 126–133.

Needleman, H., Schell, A., Belinger, D., Leviton, A., & Allred, E. (1990). The long-term effects of exposure to low doses of lead in childhood: An 11-year follow-up report. *New England Journal of Medicine, 322,* 83–88.

Neimark, J. (2005, October). Can the flu bring on psychosis? *Discover, 26*(10), 70–71.

Neimark, J. (2007, April). Autism: It's not just in the head. *Discover, 28*(4), 33–36, 38, 75.

Neimeyer, R. A. (1995). An invitation to constructivist psychotherapies. In R. A. Neimeyer & M. J. Mahoney (Eds.), *Constructivism in psychotherapy.* Washington, DC: American Psychological Association.

Neimeyer, R. A. (1999). Narrative strategies in grief therapy. *Journal of Constructivist Psychology, 12,* 65–85.

Neisser, U. (1967). *Cognitive psychology.* New York, NY: Appleton-Century-Crofts.

Neisser, U. (1997). Never a dull moment. *American Psychologist, 52,* 79–81.

Neisser, U., Boodoo, B., Bouchard, T. J. Jr., Boyukin, A. W., Brody, N., Ceci, S. J., . . . Urbina, S. (1996). Intelligence: Knowns and unknowns. *American Psychologist, 51,* 77–101.

Nelson, C. A. (1987). The recognition of facial expressions in the first two years of life: Mechanisms of development. *Child Development, 58,* 889–909.

Nelson, C. A. III, Zeanah, C. H., Fox, N. A., Marshall, P. J., Smyke, A. T., & Guthrie, D. (2007, December 21). Cognitive recovery in socially deprived young children: The Bucharest early intervention project. *Science, 318,* 1937–1940. [See also: Millum & Emanuel, 2007.]

Nelson, K. G. (2010). Exploration of classroom participation in the presence of a token economy. *Journal of Instructional Psychology, 37,* 49–56.

Nelson, M., Reid, C., Ryan, P., Willson, K., & Yelland, L. (2006). Self-reported adherence with medication and cardiovascular disease outcomes in the Second Australian National Blood Pressure Study (ANBP2). *Medical Journal of Australia, 185*(9), 487–489.

Nelson, T. D. (1993). The hierarchical organization of behavior: A useful feedback model of self-regulation. *Current Directions in Psychological Science, 2,* 121–126.

Nemecek, S. (1999, January). Unequal health. *Scientific American, 280*(1), 40–41.

Nesse, R. M., & Berridge, K. C. (1997, October 3). Psychoactive drug use in evolutionary perspective. *Science, 278,* 63–66.

Nestler, E. J., & Malenka, R. C. (2004, March). The addicted brain. *Scientific American, 290,* 78–85. [See also: Koob & Le Moal, 1997; Nestler, 2001]

Neuman, S. B. (2003). From rhetoric to reality: The case for high quality compensatory prekindergarten programs. *Phi Delta Kappan, 85,* 286–291.

Neville, H. J., Bavelier, D., Corina, D., Rauschecker, J., Karni, A., Lalwani, A., . . . Turner, R. (1998, February 3). Cerebral organization for language in deaf and hearing subjects: Biological constraints and effects of experience. *Proceedings of the National Academy of Sciences, 95,* 922–929.

Newberg, A. B., Alavi, A., Baime, M., Pourdehnad, M., Santanna, J., & d'Aquili, E. G. (2001a). The measurement of regional cerebral blood flow during the complex cognitive task of meditation: A preliminary SPECT study. *Psychiatry Research: Neuroimaging, 106,* 113–122.

Newberg, A., D'Aquili, E., & Rouse, V. (2001b). *Why God won't go away: Brain science and the biology of belief.* New York, NY: Ballantine Books.

Newcomb, T. M. (1943). *Personality and social change.* New York, NY: Holt.

Newcomb, T. M., Koenig, D. E., Flacks, R., & Warwick, D. P. (1967). *Persistence and change: Bennington College and its students after twenty-five years.* New York, NY: Wiley.

Newman, B. S., & Muzzonigro, P. G. (1993). The effects of traditional family values on the coming out process of gay male adolescents. *Adolescence, 28,* 213–226.

Newman, C. (2004, August). Why are we so fat? *National Geographic, 206,* 46–61.

Newmark-Sztainer, D., Wall, M., Guo, J., Story, M., Haines, J., & Eisenberg, M. (2006). Obesity, disordered eating, and eating disorders in a longitudinal study of adolescents: How do dieters fare 5 years later? *Journal of the American Dietetic Association, 106*(4), 559–568.

Newport, E. L., Bavelier, D., & Neville, H. J. (2001). Critical thinking about critical periods: Perspectives on a critical period for language acquisition. *Language, brain and cognitive development: Essays in honor of Jacques Mehler*, 481–502.

*New York Times*. (2011, Feb. 8). "9/11 Health and Environmental Issues." (*Times Topics*).

Niaura, R., Todaro, J. F., Stroud, L., Spiro, A. 3rd, Ward, K. D., & Weiss, S. (2002). Hostility, the metabolic syndrome, and incident coronary heart disease. *Health Psychology, 21*(6), 588–593.

Nicholson, I. (2007, Fall). Maslow: Toward a psychology of being. *The General Psychologist, 42*(2), 25–26. [See also: Baumeister & Leary, 1995; Brehm, 1992; Hatfield & Rapson, 1993; Kelley et al., 1983; Weber & Harvey, 1994a,b.]

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology, 2,* 175–220.

Nickerson, R. S., & Adams, M. J. (1979). Long-term memory for a common object. *Cognitive Psychology, 11,* 287–307.

Nicolaou, N., Shane, S., Adi, G., Mangino, M., & Harris, J. (2011). A polymorphism associated with entrepreneurship: Evidence from dopamine receptor candidate genes. *Small Business Economics, 36*(2), 151–155.

Nicoll, R. A., & Alger, B. E. (2004, December). The brain's own marijuana. *Scientific American, 291*(6), 68–71.

Niedenthal, P. M. (2007, May 18). Embodying emotion. *Science, 316,* 1002–1005.

Niemi, M. (2009, February/March). Cure in the mind. *Scientific American Mind, 20*(1), 42–49.

Nietzel, M. T., Speltz, M. L., McCauley, E. A., & Bernstein, D. A. (1998). *Abnormal psychology.* Boston, MA: Allyn & Bacon.

Nigg, J. T. (2010). Attention-deficit/hyperactivity disorder: Endophenotypes, structure, and etiological pathways. *Current Directions in Psychological Science, 19,* 24–29.

Nikkelen, S. W. C., Valkenburg, P. M., Huizinga, M., & Bushman, B. J. (2014). Media use and ADHD-related behaviors in children and adolescents: A meta-analysis. *Developmental Psychology, 50*(9), 2228–2241.

Nippold, M. A., Duthie, J. K., & Larsen, J. (2005). Literacy as a leisure activity: Free time preferences of older children and young adolescents. *Language, Speech, and Hearing Services in Schools, 36,* 93–102.

Nisbett, R. E. (2000). *Culture and systems of thought: Holistic versus analytic cognition in East and West*. Master Lecture presented at the annual convention of the American Psychological Association, Washington, DC.

Nisbett, R. E. (2003). *The geography of thought: How Asians and Westerners think differently . . . and why.* New York, NY: Free Press. [See also: Chua et al., 2005; Nisbett & Norenzayan, 2002; Winerman, 2006.]

Nisbett, R. E. (2005). Heredity, environment, and race differences in IQ: A commentary on Rushton and Jensen. *Psychology, Public Policy, and Law, 11,* 302–310.

Nisbett, R. E., Aronson, J., Blair, C., Dickens, W., Flynn, J., Halpern, D. F., & Turkheimer, E. (2012, February–March). Intelligence: New findings and theoretical developments. *American Psychologist, 67*(2), 130–159.

Nisbett, R. E., & Norenzayan, A. (2002). Culture and cognition. In D. L. Medin (Ed.), *Stevens' Handbook of Experimental Psychology* (3rd ed.). New York, NY: John Wiley & Sons.

Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review, 108,* 291–310.

Noble, K. G., Houston, S. M., Brito, N. H., Bartsch, H., Kan, E., Kuperman, J. M., . . . Sowell, E. R. (2015). Family income, parental education and brain structure in children and adolescents. *Nature Neuroscience*, *18*(5), 773–778.

Nobles, W. W. (1976). Black people in white insanity: An issue for black community mental health. *Journal of Afro-American Issues, 4,* 21–27.

Nolen-Hoeksema, S. (2001). Gender differences in depression. *Current Directions in Psychological Science, 10,* 173–176.

Nolen-Hoeksema, S., & Davis, C. G. (1999). "Thanks for sharing that": Ruminators and their social support networks. *Journal of Personality and Social Psychology, 77,* 801–814.

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science, 3,* 400–424. [See also Law, 2005; Nolen-Hoeksema & Davis, 1999]

Norcross, J. C., Koocher, G. P., & Garofalo, A. (2006). Discredited psychological treatments and tests: A Delphi poll. *Professional Psychology: Research and Practice, 37,* 515–522.

Nordal, K. C. (2010, November). Where has all the psychotherapy gone? *Monitor on Psychology, 41*(10), 17.

Norenzayan, A., & Nisbett, R. E. (2000). Culture and causal cognition. *Current Directions in Psychological Science, 9,* 132–135. [See also: Fletcher & Ward, 1988; Miller, 1984; Triandis, 1996]

Norris, J. (2013). *Traumatic brain injury research advances with $18.8M NIH award*. UCSF News Center. Retrieved from http://www.ucsf.edu/news/2013/10/109851/traumatic-brain-injury-research-advances-188-million-nih-award-administered-ucsf

Notarius, C. I. (1996). Marriage: Will I be happy or sad? In N. Vanzetti & S. Duck (Eds.), *A lifetime of relationships.* Pacific Grove, CA: Brooks/Cole.

Nova Online. (1996). *Kidnapped by UFOs?* Retrieved from www.pbs.org/wgbh/nova/aliens/carlsagan.html.

Novak, M. A., & Suomi, S. J. (1988). Psychological well-being of primates in captivity. *American Psychologist, 43,* 765–773.

Novotney, A. (2008a, July–August). Get your clients moving: Ten tips to incorporate exercise into your treatment arsenal. *Monitor on Psychology, 39*(7), 68–69.

Novotney, A. (2008b, March). Preventing harassment at schools. *Monitor on Psychology,* 18–20.

Novotney, A. (2009a, April). New solutions. *Monitor on Psychology, 40*(4), 47–51.

Novotney, A. (2009b). Postgrad growth area: Environmental psychology. *GradPsych* (7). Retrieved from www.apa.org/gradpsych/2009/09/postgrad.aspx.

Novotney, A. (2011a, June). A new emphasis on telehealth. *Monitor on Psychology, 43*(6), 40–44.

Novotney, A. (2011b). Psychology job forecast: Partly sunny. *GradPsych, 9*(2). American Psychological Association.

Novotney, A. (2013, February). The therapist effect. *Monitor on Psychology, 44*(2), 49–51.

Nowack, K. M. (1983). The relationship between stress, job performance, and burnout in college resident assistants. *Journal of College Student Personnel, 24,* 545–550.

Ntanasis-Stathopoulos, J., Tzanninis, J. G., Philippou, A., & Koutsilieris, M. (2013). Epigenetic regulation on gene expression induced by physical exercise. *Journal of Musculoskeletal and Neuronal Interactions*, *13*(2), 133–146.

Nungesser, L. G. (1990). *Axioms for survivors: How to live until you say goodbye.* Santa Monica, CA: IBS Press.

Nurnberger, J. I. Jr., & Bierut, L. J. (2007, April). Seeking the connections: Alcoholism and our genes. *Scientific American, 296*(4), 46–53.

Oakland, T., & Glutting, J. J. (1990). Examiner observations of children's WISC-R test-related behaviors: Possible socioeconomic status, race, and gender effects. *Psychological Assessment, 2,* 86–90.

Oakley, D. A. (1999). Hypnosis and conversion hysteria: A unifying model. *Cognitive Neuropsychiatry, 4,* 243–265.

Oakley, D. A. (2006). Hypnosis as a tool in research: Experimental psychopathology. *Contemporary Hypnosis 23,* 3–14. [See also: Bowers, 1983; Hilgard, 1968, 1973; Miller & Bowers, 1993; Nash, 2001.]

O'Brien, B. (2014). *NFL says a quarter of players will end up with brain problems*. Reuters, September 13, 2014. Retrieved from

http://www.reuters.com/article/2014/09/13/us-usa-nfl-concussion-idUSKBN0H80NV20140913

O'Connell, M. E., Boat. T., & Warner, K. E. (Eds.). (2010). *Preventing mental, emotional, and behavioral disorders among young people: Progress and possibilities.* Washington, DC: National Academies Press. Retrieved from www.nap.edu/openbook.php?record_id=12480&page=R1#.

O'Connor, E. M. (2001, December). Medicating ADHD: Too much? Too soon? *Monitor on Psychology, 32*(11), 50–51.

Oden, G. C. (1968). The fulfillment of promise: 40-year follow-up of the Terman gifted group. *Genetic Psychology Monographs, 77,* 3–93.

Oden, G. C. (1987). Concept, knowledge, and thought. *Annual Review of Psychology, 38,* 203–227.

O'Doherty, J., Dayan, P., Schultz, J., Deichmann, R., Friston, K., & Dolan, R. J. (2004, April 16). Dissociable roles of ventral and dorsal striatum in instrumental conditioning. *Science, 304,* 452–454.

O'Donnell, S., Webb, J. K., & Shine, R. (2010). Conditioned taste aversion enhances the survival of an endangered predator imperilled by a toxic invader. *Journal of Applied Ecology, 47*(3), 558–565.

O'Donovan, A., Lin, J., Dhabhar, F. S., Wolkowitz, O., Tillie, J. M., Blackburn, E., & Epel, E. (2009). Pessimism correlates with leukocyte telomere shortness and elevated interleukin-6 in post-menopausal women. *Brain, Behavior, & Immunity, 23,* 446–449.

O'Donovan, A., Tomiyama, A. J., Lin, J., Puterman, E., Adler, N. E., Kemeny, M., . . . Epel, E. S. (2012). *Brain, Behavior, & Immunity, 26*(4), 573–579. doi: 10.1016/j.bbi.2012.01.007. Erratum in: *Brain, Behavior, & Immunity* (2012), *26*(6), 1017.

Offer, D., Ostrov, E., & Howard, K. I. (1981). *The adolescent: A psychological self-portrait.* New York, NY: Basic Books.

Offer, D., Ostrov, E., Howard, K. I., & Atkinson, R. (1988). *The teenage world: Adolescents' self-image in ten countries.* New York, NY: Plenum Medical.

Office of the Surgeon General, U.S. Department of Health and Human Services. (2005). Advisory on alcohol use in pregnancy. Retrieved from www.surgeongeneral.gov/press-releases/sg02222005.html.

Offit, P. A., & Moser, C. A. (2009). The problem with Dr. Bob's alternative vaccine schedule. *Pediatrics, 123*(1), 164–169. doi:10.1542/peds.2008-2189

Ofshe, R., & Watters, E. (1994). *Making monsters: False memories, psychotherapy, and sexual hysteria.* New York, NY: Charles Scribner's Sons.

Öhman, A., & Mineka, S. (2001). Fears, phobias, and preparedness: Toward an evolved module of fear and fear learning. *Psychological Review, 108,* 483–522.

Okugawa, G. (2013). Cerebellum and schizophrenia—the cerebellum volume reduction theory of schizophrenia. In M. Manto, . Gruol, J. Schmahmann, et al. (Eds.), *Handbook of the cerebellum and cerebellar disorders* (pp. 1907–1921). New York, NY: Springer.

Olds, M. E., & Fobes, J. L. (1981). The central basis of motivation: Intracranial self-stimulation studies. *Annual Review of Psychology, 32,* 523–574.

Olfson, M., & Marcus, S. C. (2010). National trends in outpatient psychotherapy. *American Journal of Psychiatry, 67*(12), 1456-1463. Retrieved from http://ajp.psychiatryonline.org/doi/pdf/10.1176/appi.ajp.2010.10040570

Oliner, S. P. (2001). Heroic Altruism: Heroic and Moral Behavior in a Variety of Settings. In *Remembering for the Future 2000: Papers and Proceedings.* London, England: Palgrave.

Olton, D. S. (1992). Tolman's cognitive analyses: Predecessors of current approaches in psychology. *Journal of Experimental Psychology: General, 121,* 427–428. [See also: Menzel, 1978; Moar, 1980; Olton, 1979]

Olweus, D. (1993). *Bullying at school: What we know and what we can do.* Oxford, England: Blackwell.

Oren, D. A., & Terman, M. (1998, January 16). Tweaking the human circadian clock with light. *Science, 279,* 333–334.

Orne, M. T. (1980). Hypnotic control of pain: Toward a clarification of the different psychological processes involved. In J. J. Bonica (Ed.), *Pain* (pp. 155–172). New York, NY: Raven Press.

Ornstein, R., & Sobel, D. (1989). *Healthy pleasures.* Reading, MA: Addison-Wesley.

Orser, B. A. (2007, June). Lifting the fog around anesthesia. *Scientific American, 296*(6), 54–61.

Ortmann, A., & Hertwig, R. (1997). Is deception acceptable? *American Psychologist, 52,* 746–747. [See also: Bower, 1998d]

Osofsky, M. J., Bandura, A., & Zimbardo, P. G. (2005). The role of moral disengagement in the execution process. *Law and Human Behavior, 29*(4), 371.

Osterhout, L., & Holcomb, P. J. (1992). Event-related brain potentials elicited by syntactic anomaly. *Journal of Memory and Language, 31,* 785–806.

Ostow, M. (1973, April 27). (Untitled letter to the editor). *Science, 180,* 360–361. [See also other critiques of the Rosenhan study among other letters in the same issue.]

Ouattara, K., Lemasson, A., & Zuberbuhler, K. (2009). Campbell's monkeys concatenate vocalizations into context-specific call sequences. *Proceedings of the National Academy of Sciences, USA,* December 9, 2009. Retrieved from www.pnas.org/content/early/2009/12/08/0908118106.short.

Overmier, J. B. (2002). On learned helplessness. *Integrative Behavioral and Physiological Science, 37,* 4–8.

Overmier, J., & Seligman, M. (1967). Effects of inescapable shock upon subsequent escape and avoidance learning. *Journal of Comparative and Physiological Psychology, 63,* 23–33.

Owen, A. M., Schiff, N. D., & Laureys, S. (2009). A new era of coma and consciousness science. In S. Laureys et al. (eds.), *Progress in brain research* (Vol. 177, pp. 399–411). Elsevier: Amsterdam, The Netherlands.

Paffenbarger, R. S., Hyde, R. T., Wing, A. L., & Hsieh, C. C. (1986, March). Physical activity, all-cause mortality, and longevity of college alumni. *New England Journal of Medicine, 314,* 605–613.

Paikoff, R. L., & Brooks-Gunn, J. (1991). Do parent-child relationships change during puberty? *Psychological Bulletin, 110,* 47–66.

Palmer, S. E. (2002). Perceptual grouping: It's later than you think. *Current Directions in Psychological Science, 11,* 101–106.

Pape, T. L., Rosenow, J. M., Steiner, M., Parrish, T., Guernon, A., Harton, B., . . . Nemeth, A. J. (2015). Placebo-controlled trial of familiar auditory sensory training for acute severe traumatic brain injury: A preliminary report. *Neurorehabilitation and Neural Repair, 29*(6), 537–547.

Paré, D., Quirk, G. J., & LeDoux, J. E. (2004). New vistas on amygdala networks in conditioned fear. *Journal of Neurophysiology, 92,* 1–9.

Park, C. L., Cohen, L. H., & Murch, R. L. (1996). Assessment and prediction of stress-related growth. *Journal of Personality, 64,* 71–105.

Park, D. C. (2007). Eating disorders: A call to arms. *American Psychologist, 62,* 158.

Parker-Pope, T. (2009, June 23). How the food makers captured our brains. *New York Times.* Retrieved from www.nytimes.com/2009/06/23/health/23well.html.

Parkes, C. M. (2001). *Bereavement: Studies of grief in adult life.* New York, NY: Routledge.

Parr, W. V., and Siegert, R. (1993). Adults' conceptions of everyday memory failures in others: Factors that mediate the effects of target age. *Psychology and Aging, 8,* 599–605.

Patenaude, A. F., Guttmacher, A. E., & Collins, F. S. (2002). Genetic testing and psychology: New roles, new responsibilities. *American Psychologist, 57,* 271–282. [See also Fackelmann, 1998.]

Patrick, C. J. (2007). Getting to the heart of psychopathy. In H. Hervé & J. C. Yuille (Eds.), *Psychopathy: Theory, research, and social implications,* pp. 207–252. Hillsdale, NJ: Erlbaum.

Patterson, C. J. (2006). Children of lesbian and gay parents. *Current Directions in Psychological Science, 15,* 241–244.

Patterson, D. R. (2004, December). Treating pain with hypnosis. *Current Directions in Psychological Science, 13,* 252–255.

Patterson, D. R. (2010). *Clinical hypnosis for pain control.* Washington, DC: American Psychological Association.

Patterson, D. R., Jensen, M. P., Wiechman, S. A., & Sharar, S. R. (2010). Virtual reality hypnosis for pain associated with recovery from physical trauma. *International Journal of Clinical and Experimental Hypnosis, 58*(3), 288–300.

Patterson, F., & Linden, E. (1981). *The education of Koko.* New York, NY: Holt, Rinehart and Winston.

Patterson, J. M. (1985). Critical factors affecting family compliance with home treatment for children with cystic fibrosis. *Family Relations, 34,* 74–89.

Patton, G. C., Carlin, J. B., Shao, Q., Hibbert, M. E., Rosier, M., Selzer, R., et al. (1997). Adolescent dieting: Healthy weight control or borderline eating disorder? *Journal of Child Psychology and Psychiatry and Allied Disciplines, 38*(3), 299–306.

Patzer, G. L. (1985). *The physical attractiveness phenomena.* New York, NY: Plenum Press.

Paul, M. J., Dredze, M., & Broniatowski, D. (2014). Twitter Improves Influenza Forecasting. *PLoS Currents*, *6*. doi:10.1371/currents.outbreaks.90b9ed0f59bae4ccaa683a39865d9117

Paulesu, E. D., Démonet, J.-F., Fazio, F., McCrory, E., Chanoine, V., Brunswick, N., . . . Frith, U. (2001, March 16). Dyslexia: Cultural diversity and biological utility. *Science, 291,* 2165–2167.

Paulus, J. (2007, April/May). Lithium's healing power. *Scientific American Mind, 18*(2), 70–75.

Pavlov, I. P. (1928). *Lectures on conditioned reflexes: Twenty-five years of objective study of higher nervous activity (behavior of animals)* (Vol. 1, W. H. Gantt, Trans.). New York, NY: International Publishers.

Pavot, W., Diener, E., & Fujita, F. (1990). Extraversion and happiness. *Personality and Individual Differences, 1,* 1299–1306.

Pawlik, K., & d'Ydewalle, G. (1996). Psychology and the global commons: Perspectives of international psychology. *American Psychologist, 51,* 488–495.

Pearman, R. R. (1991, November 13). Disputing a report on "Myers–Briggs" test. *Chronicle of Higher Education,* B7.

Pearson, H. (2006, June 22). Lure of lie detectors spooks ethicists. *Nature, 441,* 918–919. [See also: McKhann, 2006; Neuroethics Needed, 2006]

Pedersen, P. (1979). Non-Western psychology: The search for alternatives. In A. J. Marsella, R. G. Tharp, & T. J. Ciborowski (Eds.), *Perspectives on cross-cultural psychology* (pp. 77–98). New York, NY: Academic Press.

Peluso, M. A. M., & Guerra de Andrade, L. H. S. (2005). Physical activity and mental health: The association between exercise and mood. *Clinics, 60,* 61–70.

Penfield, W. (1959). The interpretive cortex. *Science, 129,* 1719–1725.

Penfield, W., & Baldwin, M. (1952). Temporal lobe seizures and the technique of subtotal lobectomy. *Annals of Surgery, 136,* 625–634.

Peng, K., & Nisbett, R. E. (1999). Culture, dialectics, and reasoning about contradiction. *American Psychologist, 54,* 741–754.

Pennebaker, J. W. (1990). *Opening up: The healing power of confiding in others.* New York, NY: William Morrow.

Pennebaker, J. W. (1997). Writing about emotional experiences as a therapeutic process. *Psychological Science, 8,* 162–166.

Pennebaker, J. W., & Harber, K. D. (1991, April). *Coping after the Loma Prieta earthquake: A preliminary report.* Paper presented at the Western Psychological Association Convention, San Francisco, CA.

Pennisi, E. (2001, February 16). The human genome. *Science, 291,* 1177–1180.

Pennisi, E. (2006, September 29). Mining the molecules that made our mind. *Science, 313,* 1908–1913.

Pennisi, E. (2007, April 3). Genomicists tackle the primate tree. *Science, 316,* 218–221.

Peplau, L. A. (2003). Human sexuality: How do men and women differ? *Current Directions in Psychological Science, 12,* 37–40.

Perkins, D. F., & Lerner, R. M. (1995). Single and multiple indicators of physical attractiveness and psychosocial behaviors among young adolescents. *Journal of Early Adolescence, 15,* 268–297.

Perrin, M. A., DiGrande, L., Wheeler, K., Thorpe, L., Farfel, M., & Brackbill, R. (2007). Differences in PTSD prevalence and associated risk factors among World Trade Center disaster rescue and recovery workers. *American Journal of Psychiatry, 164,* 1385–1394.

Perry, W. G. Jr. (1970). *Forms of intellectual and ethical development in the college years: A scheme.* New York, NY: Holt, Rinehart and Winston.

Perry, W. G. Jr. (1994). Forms of intellectual and ethical development in the college years: A scheme. In B. Puka (Ed.), *Defining perspectives in moral development: Vol. 1. Moral development: A compendium* (pp. 231–248). New York, NY: Garland Publishing.

Pervin, L. A. (1985). Personality: Current controversies, issues, and directions. *Annual Review of Psychology, 36,* 83–114.

Peterson, C., & Park, N. (2010). What happened to self-actualization? Commentary on Kenrick et al. (2010). *Perspectives on Psychological Science, 5,* 320–322.

Peterson, C., & Seligman, M. E. P. (2004). *Character strengths and virtues*. Washington, DC: American Psychological Association & Oxford University Press.

Petitto, L. A., & Marentette, P. (1991). Babbling in the manual mode: Evidence for the ontogeny of language. *Science, 251,* 1483–1496.

Petrill, S. A., Plomin, R., Berg, S., Johansson, B., Pedersen, N. L., Ahern, F., & McClearn, G. E. (1998). Specific cognitive

abilities in twins age 80 and older. *Psychological Science, 9,* 183–195.

Petrosino A., Turpin-Petrosino, C., & Buehler, J. (2003, November). "Scared Straight" and other juvenile awareness programs for preventing juvenile delinquency. (Updated C2 Review). *The Campbell Collaboration Reviews of Intervention and Policy Evaluations (C2-RIPE)*. Philadelphia, PA: Campbell Collaboration. Retrieved from www.campbellcollaboration.org/doc-pdf/ssrupdt.pdf.

Petrosino, A., Turpin-Petrosino, C., Hollis-Peel, M. E., & Lavenberg, J. G. (2013). Scared Straight and other juvenile awareness programs for preventing juvenile delinquency: A systematic review. *The Campbell Collaboration*: 55. doi:10.4073/csr.2013.5.

Petrovic, P., Kalso, E., Petersson, K. M., & Ingvan, M. (2002, March 1). Placebo and opioid analgesia—Imaging a shared neuronal network. *Science, 295,* 1737–1740.

Pettigrew, T. F. (1998). Intergroup contact theory. *Annual Review of Psychology, 49,* 65–85.

Pfetsch, J., Steffgen, G., Gollwitzer, M., & Ittel, A. (2011). Prevention of aggression in schools through a bystander intervention training. *International Journal of Developmental Science, 5*(1–2), 139–149.

Pham, M. T. (2007). Emotion and rationality: A critical review and interpretation of empirical evidence. *Review of General Psychology, 11,* 155–178.

Phelan, J. (2009). *What is life? A guide to biology.* New York, NY: W. H. Freeman.

Phelps, J. A., Davis, J. O., & Schartz, K. M. (1997). Nature, nurture, and twin research strategies. *Current Directions in Psychological Science, 6,* 117–121.

Piaget, J.-P. (1962). *Play, dreams, and imitation in childhood.* New York, NY: Norton.

Pifer, A., & Bronte L. (Eds.). (1986). *Our aging society: Paradox and promise.* New York, NY: Norton.

Pilcher, J. J., & Walters, A. S. (1997). How sleep deprivation affects psychological variables related to college students' cognitive performance. *Journal of American College Health, 46,* 121–126.

Pilisuk, M., & Parks, S. H. (1986). *The healing web: Social networks and human survival.* Hanover, NH: University Press of New England.

Pillard, R., & Bailey, M. (1991). A genetic study of male sexual orientation. *Archives of General Psychiatry, 48,* 1089–1096.

Pillemer, D. B. (1984). Flashbulb memories of the assassination attempt on President Reagan. *Cognition, 16,* 63–80.

Pinel, J. P. J. (2005). *Biopsychology* (6th ed.). Boston, MA: Allyn & Bacon.

Pinel, J. P. J., Assanand, S., & Lehman, D. R. (2000). Hunger, eating, and ill health. *American Psychologist, 55,* 1105–1116.

Pines, A., & Zimbardo, P. G. (1978). The personal and cultural dynamics of shyness: A comparison between Israelis, American Jews and Americans. *Journal of Psychology and Judaism, 3,* 81–101.

Pinker, S. (1994). *The language instinct: How the mind creates language.* New York, NY: Morrow.

Pinker, S. (2002). *The blank slate: The modern denial of human nature.* New York, NY: Viking.

Pinker, S. (2006, Spring). The blank slate. *The General Psychologist, 41*(1), 1–8. Retrieved from www.apa.org/divisions/div1/news/Spring2006/GenPsychSpring06.pdf.

Pinto, R. M. (2003). The impact of secondary traumatic stress on novice and expert counselors with and without a history of trauma. *Dissertation Abstracts International, Section A: Humanities and Social Sciences, 63,* 3117.

Piper, A., & Merskey, H. (2004a). The persistence of folly: A critical examination of dissociative identity disorder. Part I. The excesses of an improbable concept. *Canadian Journal of Psychiatry, 49,* 592–600.

Piper, A., & Merskey, H. (2004b). The persistence of folly: A critical examination of dissociative identity disorder. Part II. The defence and decline of multiple personality or dissociative identity disorder. *Canadian Journal of Psychiatry, 49,* 678–683.

Pitman, G. E. (2003). Evolution, but no revolution: The "tend-and-befriend" theory of stress and coping. *Psychology of Women Quarterly, 27,* 194–195.

Platt, J. O. (2011, December 27). Lions vs. cattle: Taste aversion could solve African predator problem [Web log post]. Retrieved from http://blogs.scientificamerican.com/extinction-countdown/lions-vs-cattle-taste-aversion/

Plomin, R. (2000, September). Psychology in a post-genomics world: It will be more important than ever. *American Psychological Society Observer, 3,* 27. [See also Boomsma, Anokhin, & de Geus, 1997.]

Plomin, R. (1989). Environment and genes: Determinants of behavior. *American Psychologist, 44,* 105–111.

Plomin, R., & DeFries, J. C. (1998). The genetics of cognitive abilities and disabilities. *Scientific American, 278*(5), 62–69.

Plomin, R., Owen, M. J., & McGuffin, P. (1994). The genetic basis of complex human behaviors. *Science, 264,* 1733–1739.

Plous, S. (1996). Attitudes toward the use of animals in psychological research and education: Results from a national survey of psychologists. *American Psychologist, 51,* 1167–1180. [See also: Blum, 1994]

Plutchik, R. (1980). *Emotion: A psychoevolutionary synthesis.* New York, NY: Harper & Row.

Plutchik, R. (1984). Emotions: A general psychoevolutionary theory. In K. Scherer & P. Ekman (Eds.), *Approaches to emotion.* Hillsdale, NJ: Erlbaum.

Pogue-Geile, M. F., & Yokley, J. L. (2010). Current research on the genetic contributors to schizophrenia. *Current Directions in Psychological Science, 19,* 214–219.

Polanczyk, G., de Lima, M. S., Horta, B. L., Biederman, J., & Rohde, L. A. (2007). The worldwide prevalence of ADHD: a systematic review and metaregression analysis. *American Journal of Psychiatry, 164,* 942–948.

Polanczyk, G. V., Willcutt, E. G., Salum, G. A., Kieling, C., & Rohde, L. A. (2014). ADHD prevalence estimates across three decades: an updated systematic review and meta-regression analysis. *International Journal of Epidemiology, 43,* 434–442.

Poldrack, R. A., Wagner, A. D., Phelps, E. A., & Sharot, T. (2008). How (and why) emotion enhances the subjective sense of recollection. *Current Directions in Psychological Science, 17,* 147–152.

Pole, N., Best, S. R., Metzler, T., & Marmar, C. R. (2005). Why are Hispanics at greater risk for PTSD? *Cultural Diversity and Ethnic Minority Psychology, 11,* 144–161.

Poling, A., Gadow, K. D., & Cleary, J. (1991). *Drug therapy for behavior disorders: An introduction.* New York: Pergamon Press.

Pollak, S. D. (2008). Mechanisms linking early experience and the emergence of emotions: Illustrations from the study of maltreated children. *Current Directions in Psychological Science, 17,* 370–375.

Poole, D. A., Lindsay, D. S., Memon, A., & Bull, R. (1995). Psychotherapy and the recovery of memories of childhood sexual abuse: U.S. and British practitioners' opinions, practices, and experiences. *Journal of Consulting and Clinical Psychology, 63,* 426–437.

Poon, L. W. (1985). Differences in human memory with aging: Nature, causes, and clinical implications. In J. E. Birren & W. K. Schaie (Eds.), *Handbook of the psychology of aging* (pp. 427–462). New York, NY: Van Nostrand Reinhold.

Popejoy, D. I. (1967). *The effects of a physical fitness program on selected psychological and physiological measures of anxiety.* Unpublished doctoral dissertation. University of Illinois.

Popkin, B. M. (2007, September). The world is fat. *Scientific American, 297*(3), 88–95.

Pornari, C. D., & Wood, J. (2010). Peer and cyber aggression in secondary school students: The role of moral disengagement, hostile attribution bias, and outcome expectancies. *Aggressive Behavior*, *36*(2), 81.

Porreca, F., & Price, T. (2009, September/October). When pain lingers. *Scientific American Mind, 21*(5), 34–41. [See also: Craig & Reiman, 1996; Vogel, 1996]

Portner, M. (2008). The orgasmic mind. *Scientific American Mind, 19*(2), 67–71.

Poulsen, F. O., Holman, T. B., Busby, D. M.&, and Carroll, J. S. (2013). Physical attraction, attachment styles, and dating development. *Journal of Social and Personal Relationships, 30*(3), 301–319.

Practice Directorate Staff. (2005, February). Prescription for success. *Monitor on Psychology, 36*(2), 25–29.

Prasad, B. M., Hochstatter, T., & Sorg, B. A. (1999). Expression of cocaine sensitization: Regulation by the medial prefrontal cortex. *Neuroscience, 88*, 765–774.

Premack, D. (1965). Reinforcement theory. In D. Levine (Ed.), *Nebraska Symposium on Motivation* (pp. 128–180). Lincoln: University of Nebraska Press.

Prentice, D. A., & Miller, D. T. (1993). Pluralistic ignorance and alcohol use on campus: Some consequences on misperceiving the social norm. *Journal of Personality and Social Psychology, 64*, 243–256.

Preston, J., & Wegner, D. M. (2007). The eureka error: Inadvertent plagiarism by misattributions of effort. *Journal of Personality and Social Psychology, 92*(4), 575–558.

Pretz, J. (2008). Intuition versus analysis: Strategy and experience in complex everyday problem solving. *Memory and Cognition, 36*, 554–566.

Price, L. H., Kao, H. T., Burgers, D. E., Carpenter, L. L., & Tyrka, A. R. (2013, January 1). Telomeres and early life stress: An overview. *Biological Psychiatry, 7* (1), 15–23.

Price, M. (2009, March). A pacemaker for your brain? *Monitor on Psychology, 40*(3), 36–39.

Priest, R. F., & Sawyer, J. (1967). Proximity and peer-ship: Bases of balance in interpersonal attraction. *American Journal of Sociology, 72*, 633–649.

Primavera, L. H., & Herron, W. G. (1996). The effect of viewing television violence on aggression. *International Journal of Instructional Media, 23*, 91–104.

Prinzmetal, W. (1995). Visual feature integration in a world of objects. *Current Directions in Psychological Science, 5*, 90–94.

Provine, R. R. (2004). Laughing, tickling, and the evolution of speech and self. *Current Directions in Psychological Science, 13*, 215–218.

Putnam, F. W., Guroff, J. J., Silberman, E. K., Barban, L., & Post, R. M. (1986). The clinical phenomenology of multiple personality disorder: Review of 100 recent cases. *Journal of Clinical Psychiatry, 47,* 285–293.

Qualls, S. H., & Abeles, N. (2000). *Psychology and the aging revolution: How we adapt to longer life.* Washington, DC: American Psychological Association.

Quiñones-Vidal, E., Lõpez-García, J. J., Peñaranda-Ortega, M., & Tortosa-Gil, F. (2004). The nature of social and personality psychology as reflected in JPSP, 1965–2000. *Journal of Personality and Social Psychology, 86*, 435–452.

Rabkin, J. G., & Struening, E. L. (1976). Life events, stress, and illness. *Science, 194*, 1013–1020.

Rachman, S. (2000). Joseph Wolpe (1915–1997). *American Psychologist, 55*, 431–432.

Rahe, R. H., & Arthur, R. J. (1978, March). Life change and illness studies: Past history and future directions. *Journal of Human Stress*, 3–15.

Raichle, M. E. (1994). Visualizing the mind. *Scientific American, 270*(4), 58–64.

Raine, A. (2008). From genes to brain to antisocial behavior. *Current Directions in Psychological Science, 17,* 323–328.

Ramachandran, V. S. (2000, May 29). Mirror neurons and imitation learning as the driving force behind "the great leap forward" in human evolution. *Edge* 69).

Ramachandran, V. S., & Blakeslee, S. (1998). *Phantoms in the brain.* New York, NY: William Morrow.

Ramachandran, V. S., & Hirstein, W. (1999). The science of art: A neurological theory of aesthetic experience. *Journal of Consciousness Studies, 6*(6–7), 15–51.

Ramachandran, V. S., & Hubbard, E. M. (2001). Synaesthesia—A window into perception, thought and language. *Journal of Consciousness Studies, 8*, 3–34.

Ramachandran, V. S., & Hubbard, E. M. (2003, May). Hearing colors, tasting shapes. *Scientific American (Special Edition), 16*(3), 76–83. [See also Ramachandran & Hubbard, 2001.]

Ramachandran, V. S., & Oberman, L. M. (2006, November). Broken mirrors. *Scientific American, 295*(5), 62–69.

Ramachandran, V. S., & Rogers-Ramachandran, D. (2008, December/2009, January). I see, but I don't know. *Scientific American Mind, 19*(6), 20–22.

Ramachandran, V. S., & Rogers-Ramachandran, D. (2010, September/October). Reading between the lines. *Scientific American Mind, 21*(5), 18–20.

Rambo-Chroniak, K. M. (1999). Coping and adjustment in the freshman year transition. Unpublished dissertation, Northwestern University, Chicago, IL. (*Dissertation Abstracts International, 59* [June], 12-A, 4378.)

Ramey, C. T., & Ramey, S. L. (1998a). Early intervention and early experience. *American Psychologist, 53*, 109–120.

Ramey, C. T,. & Ramey, S. L. (1998b). In defense of special education. *American Psychologist, 53*, 1159–1160.

Randerson, J. (2002, January 26). Sleep scientists discount sheep. *New Scientist,* Issue #2327. Retrieved from www.newscientist.com/article/dn1831-sleep-scientists-discount-sheep.html

Raphael, B. (1984). *The anatomy of bereavement: A handbook for the caring professions.* London, UK: Hutchinson.

Rapoport, J. L. (1989, March). The biology of obsessions and compulsions. *Scientific American, 263*, 83–89.

Rauschecker, J. P., & Tian, B. (2000). Mechanisms and streams for processing of "what" and "where" in auditory cortex. *Proceedings of the National Academy of Sciences, 97*, 11800–11806.

Rauscher, F. H., Shaw, G. L., & Ky, K. N. (1993, October 14). Music and spatial task performance. *Nature, 365,* 611.

Rawlins, W. K. (1992). *Friendship matters: Communication, dialectics, and the life course.* New York, NY: DeGruyter.

Raymond, C. (1989, September 20). Scientists examining behavior of a man who lost his memory gain new insights into the workings of the human mind. *The Chronicle of Higher Education,* A4, A6.

Raynor, J. O. (1970). Relationships between achievement-related motives, future orientation, and academic performance. *Journal of Personality and Social Psychology, 15,* 28–33.

Raz, A., Shapiro, T., Fan, J., & Posner, M. I. (2002). Hypnotic suggestion and the modulation of Stroop interference. *Archives of General Psychiatry, 59,* 1151–1161.

Razran, G. (1954). The conditioned evocation of attitudes (cognitive conditioning?). *Journal of Experimental Psychology, 48,* 278–282.

Ready, D. D., LoGerfo, L. F., Burkan, D. T., & Lee, V. E. (2005). Explaining girls' advantage in kindergarten literacy learning: Do classroom behaviors make a difference? *The Elementary School Journal, 106,* 21–38.

Reber, A. S. (1993). *Implicit learning and tacit knowledge: An essay on the cognitive unconscious. (Oxford Psychology Series No. 19).* Oxford, England: Oxford University Press.

Rechtschaffen, A. (1998). Current perspectives on the function of sleep. *Perspectives in Biology and Medicine, 41,* 359–390. [See also: Pinel, 2005.]

Rector, N. A., & Beck, A. T. (2001). Cognitive behavioral therapy for schizophrenia: An empirical review. *Journal of Nervous & Mental Disease, 189,* 278–287.

Redker, C., Gibson, B., & Zimmerman, I. (2013). Liking of movie genre alters the effectiveness of background product placements. *Basic and Applied Social Psychology, 35*(3), 249–255.

Regier, D. A., Boyd, J. H, Burke, J. D., Rae, D. S., Myers, J. K., Kramer, M., . . . Locke, B. Z. (1988). One-month prevalence of mental disorders in the United States. *Archives of General Psychiatry, 45,* 977–986.

Regier, D. A., Narrow, W. E., Rae, D. S., Manderscheid, R. W., Locke, B. Z., & Goodwin, F. K. (1993). The de facto U.S. mental and addictive disorders service system: Epidemiologic Catchment Area prospective 1-year-prevalence rates of disorders and services. *Archives of General Psychiatry, 50,* 85–94.

Rentfrow, P. J., Gosling, S. D., & Potter, J. (2008). A theory of the emergence, persistence, and expression of geographic variation in psychological characteristics. *Perspectives on Psychological Science, 3,* pp. 339–369. doi:10.1111/j.1745-6924.2008.00084.x

Rentfrow, P. J., Jost, J. T., Gosling, S. D., & Potter, J. (2009). Statewide differences in personality predict voting patterns in 1996–2004 U.S. presidential elections. In J. T. Jost, A. C. Kay, & H. Thorisdottir (Eds.), *Social and psychological bases of ideology and system justification* (pp. 314–347). Oxford, England: Oxford University Press.

Rescorla, R. A., & Wagner, A. R. (1972). A theory of Pavlovian conditioning: Variations in the effectiveness of reinforcement and nonreinforcement. In A. H. Black & W. F. Prokasy (Eds.), *Classical conditioning, II: Current research and theory* (pp. 64–94). New York, NY: Appleton-Century-Crofts.

Resnick, S. M. (1992). Positron emission tomography in psychiatric illness. *Current Directions in Psychological Science, 1,* 92–98.

Rest, J. R., & Thoma, S. J. (1976). Relation of moral judgment development to formal education. *Developmental Psychology, 21,* 709–714.

Reuter-Lorenz, P. A., & Miller, A. C. (1998). The cognitive neuroscience of human laterality: Lessons from the bisected brain. *Current Directions in Psychological Science, 7,* 15–20.

Reynolds, C. R. (2000). Why is psychometric research on bias in mental testing so often ignored? *Psychology, Public Policy, and Law, 6,* 144–150.

Rhodes, G., Sumich, A., & Byatt, G. (1999). Are average facial configurations attractive only because of their symmetry? *Psychological Science, 10,* 52–58. [See also: Langlois & Roggman, 1990; Langlois et al., 1994.]

Ricardo, A. R. (2011, May 24). *Psychology from Islamic perspective.* Retrieved from http://islamic-world.net/index.php?option=com_content&view=article&id=675:psychology-from-islamic-perspective&catid=35:islamic-phsycology&Itemid=67

Riccio, D. C., Millin, P. M., & Gisquet-Verrier, P. (2003). Retrograde amnesia: Forgetting back. *Current Directions in Psychological Science, 12,* 41–44.

Rich, L. E. (2004, January). Bringing more effective tools to the weight-loss table. *Monitor on Psychology, 35*(1), 52–55.

Rickgarn, R. L. V. (1996). The need for postvention on college campuses: A rationale and case study findings. In C. A. Corr & D. E. Balk (Eds.), *Handbook of adolescent death and bereavement* (pp. 273–292). New York, NY: Springer Publishing.

Richards, J. M., & Gross, J. J. (2000). Emotion regulation and memory: The cognitive costs of keeping one's cool. *Journal of Personality & Social Psychology, 79,* 410–424.

Ridaura, V. K., Faith, J. J., Rey, F. E., Cheng, J., Duncan, A. E., Kau, A. L., . . . Gordon, J. I. (2013, September 6). Gut microbiota from twins discordant for obesity modulate metabolism in mice. *Science, 341*(6150), p. 1241214. doi:10.1126/science.1241214

Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). *Generation M2: Media in the lives of 8–18 year olds.* Kaiser Family Foundation.

Riessman, C. K., Whalen, M. H., Frost, R. O., & Morgenthau, J. E. (1991). Romance and help-seeking among women: "It hurts so much to care." *Women and Health, 17,* 21–47.

Riolli, L. (2002). Resilience in the face of catastrophe: Optimism, personality and coping in the Kosovo crisis. *Journal of Applied Social Psychology, 32,* 1604–1627.

Ripple, C. H., Gilliam, W. S., Chanana, N., & Zigler, E. (1999). Will fifty cooks spoil the broth? The debate over entrusting Head Start to the states. *American Psychologist, 54,* 327–343.

Ripple, C. H., & Zigler, E. (2003). Research, policy, and the Federal role in prevention initiatives for children. *American Psychologist, 58,* 482–490. [See also: Ripple et al., 1999; Schweinhart & Weikart, 1986; Smith, 1991.]

Rips, L. J. (1997). Goals for a theory of deduction: Reply to Johnson-Laird. *Minds and Machines, 7,* 409–424.

Rizzolatti, G., Fogassi, L., & Gallese, V. (2006, November). Mirrors in the mind. *Scientific American, 295*(5), 54–61.

Robbins, C., Fortenberry, J. D., Reece, M., Herbenick, D., Sanders, S., & Dodge, B. (2010). Masturbation frequency and patterns among U.S. adolescents. *Journal of Adolescent Health, 46*(2), S36–S37.

Robbins, D. (1971). Partial reinforcement: A selective review of the alleyway literature since 1960. *Psychological Bulletin, 76,* 415–431.

Robbins, J. (2000, April). Wired for sadness. *Discover, 21*(4), 77–81.

Roberts, S. B., Flannelly, K. J., Weaver, A. J., & Rigley, C. R. (2003). Compassion fatigue among chaplains, clergy, and other respondents after September 11th. *Journal of Nervous and Mental Disease, 191,* 756–758.

Robins, C. J. (1988). Attributions and depression: Why is the literature so inconsistent? *Journal of Personality and Social Psychology, 54,* 880–889.

Robins, L. N., Locke, B. Z., & Regier, D. A. (1991). An overview of psychiatric disorders in America. In L. N. Robins & D. A. Regier (Eds.), *Psychiatric disorders in America: The epidemiologic catchment area study.* New York, NY: Free Press.

Robins, R. W. (2005, October 7). The nature of personality: Genes, culture, and national character. *Science, 310,* 62–63.

Robinson, L. O., & Slowikowski, J. (2011, January 31). Scary—and ineffective: Traumatizing at-risk kids is not the way to lead them away from crime and drugs. *Baltimore Sun.* Retrieved from http://articles.baltimoresun.com/2011-01-31/news/bs-ed-scared-straight-20110131_1_straight-type-programs-straight-program-youths

Robinson, N. M., Zigler, E., & Gallagher, J. J. (2000). Two tails of the normal curve: Similarities and differences in the study of mental retardation and giftedness. *American Psychologist, 55,* 1413–1424. [See also Baumeister, 1987; Detterman, 1999; Greenspan, 1999.]

Robison, J., & Rogers, M. A. (1994). Adherence to exercise programmes. *Sports Medicine, 17,* 39–52.

Roche, S. M., & McConkey, K. M. (1990) Absorption: Nature, assessment, and correlates. *Journal of Personality & Social Psychology, 59,* 91–101.

Rock, I., & Palmer, S. (1990, December). The legacy of Gestalt psychology. *Scientific American, 263,* 84–90.

Rodin, J. (1986). Aging and health: Effects of the sense of control. *Science, 233,* 1271–1276.

Rodin, J., & Salovey, P. (1989). Health psychology. *Annual Review of Psychology, 40,* 533–579.

Roediger, H. L., III, & McDermott, K. B. (1995). Creating false memories: Remembering words not presented in lists. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21,* 803–814.

Roediger, H. L., III, & McDermott, K. B. (2000, January/February). *Psychological Science Agenda,* 8–9.

Roediger, R. (2004, March). What happened to behaviorism? *APS Observer, 17*(3), 5, 40–42.

Roesch, M. R., & Olson, C. R. (2004, April 9). Neuronal activity related to reward value and motivation in primate frontal cortex. *Science, 304,* 307–310.

Rogers, C. R. (1951). *Client-centered therapy: Its current practice, implications and theory.* Boston, MA: Houghton Mifflin.

Rogers, C. R. (1961). *On becoming a person: A therapist's view of psychotherapy.* Boston, MA: Houghton Mifflin. [See also: Rogers, 1951, 1980.]

Rogers, C. R. (1977). *On personal power: Inner strength and its revolutionary impact.* New York, NY: Delacorte.

Rogers, C. R. (1982, July/August) Roots of madness. In T. H. Carr & H. E. Fitzgerald (Eds.), *Psychology 83/84* (pp. 263–267). Guilford, CT: Dushkin. (Originally published in *Science 82,* July/August, 1982).

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context.* New York: Oxford University Press.

Rogoff, B. (2003). *The cultural nature of human development.* New York, NY: Oxford University Press.

Rohan, T. (2014). Marcus Mariota of Oregon wins Heisman Trophy, and Hawaii rejoices. *New York Times.* Retrieved from http://www.nytimes.com/2014/12/14/sports/ncaafootball/marcus-mariota-of-oregon-wins-heisman-trophy.html?_r=0

Rohrer, D., & Pashler, H. (2012). Learning styles: Where's the evidence? *Medical Education, 46,* 34–35.

Rohrer, M., et al. (1954). The stability of autokinetic judgment. *Journal of Abnormal and Social Psychology, 49,* 595–597.

Roll, S., Hinton, R., & Glazer, M. (1974). Dreams and death: Mexican Americans vs. Anglo-American. *Interamerican Journal of Psychology, 8,* 111–115.

Rollman, G. B., & Harris, G. (1987). The de tect-ability, discriminability, and perceived magnitude of painful electrical shock. *Perception & Psychophysics, 42,* 257–268.

Rolls, B. J., Federoff, I. C., & Guthrie, J. F. (1991). Gender differences in eating be havior and body weight regulation. *Health Psychology, 10,* 133–142.

Rolnick, J. (1998, December 4). Treating mental disorders: A neuroscientist says no to drugs. *The Chronicle of Higher Education,* A10.

Roozendaal, B., McEwen, B. S., & Chattarji, S. (2009, June). Stress, memory, and the amygdale. *Nature reviews neuroscience, 10,* 423–433.

Rosch, E. (1999). Is wisdom in the brain? *Psychological Science, 10,* 222–224.

Rosen, J. B., & Schulkin, J. (1998). From normal fear to pathological anxiety. *Psychological Review, 105,* 325–350.

Rosenblatt, P. (1966). A cross-cultural study of child rearing and romantic love. *Journal of Personality and Social Psychology, 4,* 336–338.

Rosenhan, D. L. (1969). Some origins of concern for others. In P. Mussen, J. Langer, & M. Covington (Eds.), *Trends and issues in developmental psychology.* New York, NY: Holt, Rinehart & Winston.

Rosenhan, D. L. (1973a). On being sane in insane places. *Science, 179,* 250–258.

Rosenhan, D. L. (1973, April 27). (Untitled letter to the editor). *Science, 180,* 360–361. [See also the critiques of Rosenhan's study among other letters in the same issue.]

Rosenhan, D. L., & Seligman, M. E. P. (1995). *Abnormal psychology* (3rd ed.). New York, NY: Norton.

Rosenheck, R. A., Leslie, D., L., Sindelar, J., Miller, E. A., Lin, H., Stroup, T. S., . . . Lieberman, J. (2006). Cost-effectiveness of second-generation antipsychotics and perphenazine in a randomized trial of treatment for chronic schizophrenia. *American Journal of Psychiatry, 163,* 2080–2089.

Rosenthal, R. (2002). Covert communication in classrooms, clinics, courtrooms, and cubicles. *American Psychologist, 57,* 839–849.

Rosenthal, R., & Lawson, R. (1964). A longitudinal study of the effects of experimenter bias on the operant learning of laboratory rats. *Journal of Psychiatric Research, 2,* 61–72.

Rosenzweig, M. R. (1992). Psychological science around the world. *American Psychologist, 47,* 718–722.

Rosenzweig, M. R. (1999). Continuity and change in the development of psychology around the world. *American Psychologist, 54,* 252–259.

Ross, C. A., Miller, S. D., Reagor, P., Bjornson, L., Fraser, G. A., & Anderson, G. (1990). Structured interview data on 102 cases of multiple personality disorder from four centers. *American Journal of Psychiatry, 147,* 596–601.

Ross, C. A., Norton, G. R., & Wozney, K. (1989). Multiple personality disorder: An analysis of 236 cases. *Canadian Journal of Psychiatry, 34,* 413–418.

Ross, P. (2003, September). Mind readers. *Scientific American, 289,* 74–77.

Ross, P. E. (2006, August). The expert mind. *Scientific American, 295*(8), 64–71. [See also: Bédard & Chi, 1992; Bransford et al., 1986; Chi et al., 1982; Glaser, 1990; Greeno, 1989; Klahr & Simon, 2001.]

Rothbaum, B. O., & Hodges, L. F. (1999). The use of virtual reality exposure in the treatment of anxiety disorders. *Behavior Modification, 23,* 507–525.

Rothbaum, B. O., Hodges, L. Smith, S., Lee, J. H., & Price, L. (2000). A controlled study of virtual reality exposure therapy for the fear of flying. *Journal of Consulting & Clinical Psychology, 68,* 1020–1026.

Rothbaum, F. M., Weisz, J. R., & Snyder, S. S. (1982). Changing the world and changing the self: A two-process model of perceived control. *Journal of Personality and Social Psychology, 42,* 5–37.

Rothenberger, A., & Banaschewski, T. (2007). Informing the ADHD debate. *Scientific American Reports, 17,* 36–41.

Rottenberg, J. (2014, January 31). An evolved view of depression. *The Chronicle Review,* B10–B12.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs, 80* (Whole no. 609).

Rotter, J. B. (1971, June). External control and internal control. *Psychology Today, 4,* 37–42, 58–59.

Rotter, J. B. (1990). Internal versus external control of reinforcement: A case history of a variable. *American Psychologist, 45,* 489–493.

Roush, W. (1996, July 5). Live long and prosper? *Science, 273,* 42–46.

Rozin, P. (1996). Towards a psychology of food and eating: From motivation to module to model to marker, morality, meaning, and metaphor. *Current Directions in Psychological Science, 5,* 18–24.

Rubenstein, J., Meyer, D., & Evans, J. (2001). Executive control of cognitive processes in task switching. *Journal of Experimental Psychology: Human Perception and Performance, 27*(4), 763–797.

Rubin, G. J., Brewin, C. R., Greenberg, N., Simpson, J., & Wessely, S. (2005). Psychological and behavioural reactions to the bombings in London on 7 July 2005: Cross sectional survey of a representative sample of Londoners. *British Medical Journal,* 331, 606.

Ruesch, U., & McLaughlin, T. F. (1981) Effects of a token system using a free time contingency to increase assignment completion with individuals in the regular classroom. *B. C. Journal of Special Education, 5,* 347–355.

Rumbaugh, D. M., & Savage-Rumbaugh, E. S. (1994). Language and apes. *The Psychology Teacher Network, 4,* 2–5.

Rushton, J. P., & Jensen, A. R. (2005). Thirty years of research on race differences in cognitive ability. *Psychology, Public Policy, and Law, 11,* 235–294. [See also Nisbett, 2005; Shiraev & Levy, 2007]

Russell, A., Mize, J., & Bissaker, K. (2002). Parent-child relationships. In P. K. Smith & C. H. Hart (Eds.), *Handbook of childhood social development.* Oxford, England: Blackwell.

Russell, J. A., & Widen, S. C. (2002). Words versus faces in evoking preschool children's knowledge of the causes of emotions. *International Journal of Behavioral Developement, 28,* 97–103. doi: 10.1080/0165025004000582.

Rutter, M. (2006). *Genes and behavior: Nature–nurture interplay explained.* Malden, MA: Blackwell Publishing. [See also Bouchard, 1994; Caspi et al., 2002; DeAngelis, 1997; Gelernter, 1994; Hamer, 1997; Hamer, 2002; Lai et al., 2001; Plomin, 2003; Plomin, Owen, & McGuffin, 1994; Plomin & Rende, 1991; Saudino, 1997.]

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55,* 68–78.

Ryff, C. D. (1989). In the eye of the beholder: Views of psychological well-being among middle-aged and older adults. *Psychology and Aging, 4,* 195–210.

Ryff, C. D., & Heidrich, S. M. (1997). Experience and well-being: Explorations on domains of life and how they matter. *International Journal of Behavioral Development, 20,* 193–206.

Ryff, C. D., & Heincke, S. G. (1983). The subjective organization of personality in adulthood and aging. *Journal of Personaltiy and Social Psychology, 44,* 807–816.

Saarinen, T. F. (1987). *Centering of mental maps of the world: Discussion paper.* Tucson: University of Arizona, Department of Geography and Regional Development.

Sabin-Farrell, R., & Turpin, G. (2003). Vicarious traumatization: Implications for the mental health of health workers? *Clinical Psychology Review, 23,* 449–480.

Sackheim, H. A., Prudic, J., Devanand, D. P., Nobler, M. S., Lisanby, S. H., Peyser, S., Fitzsimons, L., Moody, B. J., & Clark, J. (2000). A prospective, randomized, double-blind comparison of bilateral and right unilateral electroconvulsive therapy at different stimulus intensities. *Archives of General Psychiatry, 57,* 425–434.

Sakaki, M. (2007). Mood and recall of autobiographical memory: The effect of focus of self-knowledge. *Journal of Personality, 75,* 421–450. [See also: Blaney, 1986; Bower, 1981; Eich et al., 1997; Gilligan & Bower, 1984; Goodwin & Sher, 1993; Lewinsohn & Rosenbaum, 1987; MacLeod & Campbell, 1992; Matt et al., 1992; Ruiz-Caballero & Bermúdez, 1995.]

Salimpoor, V. N., van den Bosch, I., Kovacevic, N., McIntosh, A. R., Dagher, A., & Zatorre, R. J. (2013, April 12). Interactions between the nucleus accumbens and auditory cortices predict music reward value. *Science, 340*(6129), 216–219. *doi:* 10.1126/science.1231059

Salovey, P., & Grewal, D. (2005). The science of emotional intelligence. *Current Directions in Psychological Science, 14,* 281–285.

Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition, and Personality, 9,* 185–211. [See also Mayer & Salovey, 1997, 1995.]

Salovey, P., Rothman, A. J., Detweiler, J. B., & Steward, W. T. (2000). Emotional states and physical health. *American Psychologist, 55,* 110–121.

Saltzstein, H. D., & Sandberg, L. (1979). Indirect social influence: Change in judgmental processor anticipatory conformity. *Journal of Experimental Social Psychology, 15,* 209–216. [See also: Deutsch & Gerard, 1955; Lott & Lott, 1961.]

Sanders, L. (2009, April 25). Specialis revelio! It's not magic, it's neuroscience. *Science News, 175*(9), 22–25.

Sanders, L. (2010, July 29). Sadness response strengthens with age. *Science News.* Retrieved from www.sciencenews.org/view/generic/id/61613.

Sanders, L. (2014, July 26). Hubs go awry in brain disorders. *Science News,* 14–15.

Santa Cruz, J. (2014, March 10). Body image pressure increasingly affects boys. *The Atlantic.*

Santarelli, L., Saxe, M., Gross, C., Surget, A., Battaglia, F., Dulawa, S., . . . Hen, R. (2003, August 8). Requirement of hippocampal neurogenesis for the behavioral effects of anti-depressants. *Science, 301,* 805–809. [See also: Dubuc, 2002; Vogel, 2003]

Sapolsky, R. (1998). *Why zebras don't get ulcers: An updated guide to stress, stress-related disease and coping.* New York, NY: W. H. Freeman.

Sapolsky, R. (2002, November). The loveless man . . . who invented the science of love. *Scientific American, 287*(5), 95–96.

Sapolsky, R. M. (1990). Adrenocortical function, social rank, and personality among wild baboons. *Biological Psychiatry, 28,* 1–17.

Sapolsky, R. M. (1992). *Stress: The aging brain and the mecha-nisms of neuron death.* Cambridge, MA: MIT Press.

Sapolsky, R. M. (1994). *Why zebras don't get ulcers: An updated guide to stress, stress-related disease, and coping.* New York, NY: Freeman.

Sarbin, T. R., & Coe, W. C. (1972). *Hypnosis: A social psychologi-cal analysis of influence communication.* New York, NY: Holt, Rinehart & Winston.

Savage-Rumbaugh, E. S. (1990). Language acquisition in a non-human species: Implications for the innateness debate. *Developmental Psychobiology, 23,* 559–620. [See also: Patter-son, 1978; Premack, 1971, 1976; Rumbaugh, 1977.]

Savin-Williams, R. C. (2006). Who's gay? Does it matter? *Cur-rent Directions in Psychological Science, 15,* 40–44.

Savitsky, J. C., & Lindblom, W. D. (1986). The impact of the guilty but mentally ill verdict on juror decisions: An empiri-cal analysis. *Journal of Applied Social Psychology, 16,* 686–701.

Sawa, A., & Snyder, S. H. (2002, April 26). Schizophrenia: Diverse approaches to a complex disease. *Science, 296,* 692–695.

Sax, B. (2002). *Animals in the Third Reich: Pets, scapegoats, and the Holocaust.* London, England: Continuum International Publishers.

Sax, L., & Kautz, K. J. (2003). Who first suggests the diagnosis of attention-deficit/hyperactivity disorder? *Annals of Family Medicine, 1,* 171–174.

Saxe, L., Dougherty, D., & Cross, T. (1985). The validity of polygraph testing: Scientific analysis and public contro-versy. *American Psychologist, 40,* 355–366.

Saxe, L. (1991). Lying: Thoughts of an applied social psychol-ogist. *American Psychologist, 46,* 409–415.

Saxe, L. (1994). Detection of deception: Polygraph and integ-rity tests. *Current Directions in Psychological Science, 3,* 69–73.

Scarr, S. (1998). American child care today. *American Psycholo-gist, 53,* 95–108.

Scarr, S., & Weinberg, R. (1976). IQ test performance of black children adopted by white families. *American Psychologist, 31,* 726–739.

Scarr, S., & Weinberg, R. A. (1978, April). Attitudes, interests, and IQ. *Human Nature, 1,* 29–36.

Schachter, S. (1971). *Emotion, obesity and crime.* New York, NY: Academic Press.

Schachter, S., & Singer, J. E. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review, 69*(5), 379–399.

Schacter, D. L. (1992). Understanding implicit memory: cognitive neuroscience approach. *American Psychologist, 47,* 559–569.

Schacter, D. L. (1996). *Searching for memory: The brain, the mind, and the past.* New York, NY: Basic Books. [See also: Ander-son, 1982; Tulving, 1983]

Schacter, D. L. (1999). The seven sins of memory: Insights from psychology and cognitive neuroscience. *American Psychologist, 54,* 182–203.

Schacter, D. L. (2001). *The Seven Sins of Memory: How the Mind Forgets and Remembers.* Boston, MA: Houghton Mifflin.

Schafe, G. E., Doyère, V., & LeDoux, J. E. (2005). Tracking the fear engram: The lateral amygdala is an essential locus of fear memory storage. *Journal of Neuroscience, 25,* 10,010–10,015.

Schaller, M., Neuberg, S. L., Griskevicius, V., & Kenrick, D. T. (2010). Pyramid power: Response to commentaries. *Perspec-tives on Psychological Science, 5,* 335–337.

Schanen, N. C. (2006). Epigenetics of autism spectrum disor-ders. *Human Molecular Genetics, 15*(Spec No 2), R138–R150. doi:10.1093/hmg/ddl213

Schank, R. C., & Abelson, R. (1977). *Scripts, plans, goals and understanding: An inquiry into human knowledge and struc-tures.* Hillsdale, NJ: Erlbaum.

Scharfe, E., & Bartholomew, K. (1998). Do you remember? Recollections of adult attachment patterns. *Personal Relation-ships, 5,* 219–234.

Schatzberg, A. F. (1991). Overview of anxiety disorders: Prevalence, biology, course, and treatment. *Journal of Clinical Psychiatry, 42,* 5–9.

Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engage-ment: A multi-sample study. *Journal of Organizational Behav-ior, 25,* 293–315.

Schaufeli, W. B., & Enzmann, D. (1998). *The burnout companion to study and practice: A critical analysis.* London, England: Taylor & Francis.

Schick, T., Jr., & Vaughn, L. (2001). *How to think about weird things: Critical thinking for a new age* (3rd ed.). New York, NY: McGraw-Hill.

Schiff, M., & Bargal, D. (2000). Helping characteristics of self-help and support groups: Their contribution to participants' subjective well-being. *Small Group Research, 31,* 275–304.

Schlenker, B. R., Weingold, M. F., & Hallam, J. R. (1990). Self-serving attributions in social context: Effects of self-esteem and social pressure. *Journal of Personality and Social Psychol-ogy, 58,* 855–863. [See also: Epstein & Feist, 1988; Ickes & Layden, 1978.]

Schmidt, R. A., & Bjork, R. A. (1992). New conceptualizations of practice: Common principles in three paradigms suggest new concepts for training. *Psychological Science, 3,* 207–217.

Schmitt, D. P., Allik, J., McCrae, R. R., & BenetMartínez, V. (2007). The geographic distribution of Big Five personal-ity traits: Patterns and profiles of human self-description across 56 nations. *Journal of Cross-Cultural Psychology, 38,* 173–212. [See also: Birenbaum & Montag, 1986; Guthrie & Bennet, 1970; McCrae & Costa, 1997; Paunonen et al., 1992.]

Schmahmann, J. D. (2010). The role of the cerebellum in cog-nition and emotion: Personal reflections since 1982 on the dysmetria of thought hypothesis, and its historical evolu-tion from theory to therapy. *Neuropsychology Review, 20*(3), 236–260.

Schmahmann, J. D., & Caplan, D. (2006). Cognition, emotion, and the cerebellum. *Brain: A Journal of Neurology, 129*(2), 290–292.

Schmolck, H., Buffalo, E. A., & Squire, L. R. (2000). Memory distortions develop over time: Recollections of the O. J. Simpson trial verdict after 15 and 32 months. *Psychological Science, 11,* 39–45.

Schneider, K., & May, R. (1995). *The psychology of existence: An integrative, clinical perspective.* New York, NY: McGraw-Hill.

Schooler, J. W., Falshore, M., & Fiore, S. M. (1995). Putting insight into perspective. In R. J. Sternberg & J. E. Davidson (eds.), *The nature of insight* (pp. 589–597). Cambridge: Massachusetts Institute of Technology Press.

Schou, M. (1997). Forty years of lithium treatment. *Archives of General Psychiatry, 54,* 9–13.

Schreiber, F. R. (1973). *Sybil.* New York, NY: Warner Books. Schroeder, D. A., Penner, L. A., Dovidio, J. F., & Piliavin, J. A. (1995). *The psychology of helping and altruism.* New York, NY: McGraw-Hill.

Schroeder, D. A., & Prentice, D. A. (1995). *Pluralistic ignorance and alcohol use on campus II: Correcting misperceptions of the social norm.* Unpublished manuscript, Princeton University.

Schroeder, S. R., Schroeder, C. S., & Landesman, S. (1987). Psychological services in educational settings to persons with mental retardation. *American Psychologist, 42,* 805–808.

Schulkin, J. (1994). Melancholic depression and the hormones of adversity: A role for the amygdala. *Current Directions in Psychological Science, 3,* 41–44.

Schultz, D. P., & Schultz, S. E. (2006). *Psychology and work today: An introduction to industrial and organizational psychology* (9th ed.). Upper Saddle River, NJ: Prentice Hall.

Schulz, R., & Heckhausen, J. (1996). A life span model of successful aging. *American Psychologist, 51,* 702–714.

Schuster, M. A., Stein, B. D., Jaycox, L. H., Collins, R. L., Marshall, G. N., Elliott, M. N., . . . Berry, S. H. (2001). A national survey of stress reactions after the September 11th, 2001, terrorist attacks. *New England Journal of Medicine, 345,* 1507–1512.

Schwartz, B. (1997). Psychology, idea technology, and ideology. *Psychological Science, 8,* 21–27.

Schwartz, B., & Ward, A. (2004). Doing better but feeling worse: The paradox of choice. *Positive Psychology in Practice*, 86–104.

Schwartz, C. E., Wright, C. I., Shin, L. M., Kagan, J., & Rauch, S. L. (2003, June 20). Inhibited and uninhibited infants "grown up": Adult amygdalar response to novelty. *Science, 300,* 1952–1953.

Schwartz, J., & Wald, M. L. (2003, March 9). Smart people working collectively can be dumber than the sum of their brains: "Groupthink" is 30 years old, and still going strong. *New York Times.* Retrieved from www.mindfully.org/Reform/2003/Smart-People-Dumber9mar03.htm.

Schwartz, J. M., Stoessel, P. W., Baxter, L. R., Martin, K. M., & Phelps, M. E. (1996). Systematic changes in cerebral glucose metabolic rate after successful behavior modification treatment of obsessive–compulsive disorder. *Archives of General Psychiatry, 53,* 109–116.

Schwartz, P. (1994). *Peer marriage: How love between equals really works.* New York, NY: Free Press.

Schwarz, N. (1999). Self-reports: How the questions shape the answers. *American Psychologist, 54,* 93–105.

Schwarzer, R. (Ed.). (1992). *Self-efficacy: Thought control of action.* Washington, DC: Hemisphere.

Schwebel, A. I., & Fine, M. A. (1994). *Understanding and helping families: A cognitive behavioral approach.* Hillsdale, NJ: Erlbaum.

Scott, K. G., & Carran, D. T. (1987). The epidemiology and prevention of mental retardation. *American Psychologist, 42,* 801–804.

Scovern, A. W., & Kilmann, P. R. (1980). Status of electroconvulsive therapy: Review of outcome literature. *Psychological Bulletin, 87,* 260–303.

Scoville, W. B., & Milner, B. (1957). Loss of recent memory after bilateral hippocampal lesions. *Journal of Neurology, Neurosurgery, & Psychiatry, 20,* 11–21. Retrieved March 10, 2008, from http://homepage.mac.com/sanagnos/scovillemilner1957.pdf

Scully, J. A., Tosi, H., & Banning, K. (2000). Life events checklist: Revisiting the Social Readjustment Rating Scale after 30 years. *Educational and Psychological Measurement, 60,* 864–876.

Searleman, A. (2007, March 12). Is there such a thing as a photographic memory? And if so, can it be learned? *Scientific American.* Retrieved from www.scientificamerican.com/article.cfm?id=is-there-such-a-thing-as.

Seeman, T. E., Dubin, L. F., & Seeman, M. (2003). Religiosity/spirituality and health: A critical review of the evidence for biological pathways. *American Psychologist, 58,* 53–63.

Segal, M. W. (1974). Alphabet and attraction: An unobtrusive measure of the effect of propinquity in a field setting. *Journal of Personality and Social Psychology, 30,* 654–657.

Segall, M. H., Dasen, P. R., Berry, J. W., & Poortinga, Y. H. (1990). *Human behavior in global perspective: An introduction to cross-cultural psychology.* Boston, MA: Allyn & Bacon. [See also: Deregowski, 1980; Kitayama et al., 2003; Segall, 1994; Segall et al., 1966; Stewart, 1973.]

Segall, M. H. (1994). A cross-cultural research contribution to unraveling the nativist/empiricist controversy. In W. J. Lonner & R. Malpass, *Psychology and culture* (pp. 135–138). Boston: Allyn & Bacon.

Segall, M. H., Dasen, P. R., Berry, J. W., & Poortinga, Y. H. (1999). *Human behavior in global perspective: An introduction to cross-cultural psychology* (2nd ed.). Boston, MA: Allyn & Bacon.

Segall, M. H., Lonner, W. J., & Berry, J. W. (1998). Cross-cultural psychology as a scholarly discipline: On the flowering of culture in behavioral research. *American Psychologist, 53,* 1101–1110.

Seider, B. H., Shiota, M. N., Whalen, P., & Levenson, R. W. (2010). Greater sadness reactivity in late life. *Social Cognitive and Affective Neuroscience.* Retrieved from http://scan.oxfordjournals.org/content/early/2010/07/22/scan.nsq069.full.pdf+html.

Sekuler, R., & Blake, R. (1994). *Perception*, 3rd ed. New York, NY: McGraw-Hill.

Selby, E. A., & Joiner, T. E., Jr. (2009). Cascades of emotion: The emergence of borderline personality disorder from emotional and behavioral dysregulation. *Review of General Psychology, 13,* 219–229.

Selfridge, O. G. (1955). Pattern recognition and modern computers. In *Proceedings of the Western Joint Computer Conference.* New York, NY: Institute of Electrical and Electronics Engineers.

Seligman, M. E. P. (1971). Preparedness and phobias. *Behavior Therapy, 2,* 307–320.

Seligman, M. E. P. (1973, June). Fall into helplessness. *Psychology Today, 7,* 43–48.

Seligman, M. E. P. (1975). *Helplessness: On depression, development and death.* San Francisco, CA: Freeman.

Seligman, M. E. P. (1991). *Learned optimism.* New York: Knopf.

Seligman, M. E. P. (2002). *Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfillment.* New York, NY: Free Press.

Seligman, M. E. P., & Maier, S. F. (1967). Failure to escape traumatic shock. *Journal of Experimental Psychology, 74,* 1–9.

Seligman, M. E. P., Rashid, T., & Parks, A. (2006). Positive psychotherapy. *American Psychologist, 61,* 774–788.

Seligson, S. V. (1994, November/December). Say good night to snoring. *Health, 8*(7), 89–93.

Selye, H. (1956). *The stress of life.* New York, NY: McGraw-Hill.

Selye, H. (1991). *Stress without distress.* New York, NY: Signet Books.

Serpell, R. (1994). The cultural construction of intelligence. In W. J. Lonner & R. Malpass, *Psychology and culture* (pp. 157–163). Boston: Allyn & Bacon.

Service, R. F. (1999, April 23). Bypassing nervous system damage with electronics. *Science, 284,* 579.

Sethi-Iyengar, S., Huberman, G., & Jiang, W. (2004). How much choice is too much? Contributions to 401(k) retirement plans. In Mitchell, O. S. & Utkus, S. (Eds.), *pension design and structure: New lessons from behavioral finance* (pp. 83–95). Oxford: Oxford University Press.

Seybold, K. S., & Hill, P. C. (2001). The role of religion and spirituality in mental and physical health. *Current Directions in Psychological Science, 10,* 21–24.

Shadish, W. R., Matt, G. E., Navarro, A. M., & Phillips, G. (2000). The effects of psychological therapies under clinically representative conditions: A meta-analysis. *Psychological Bulletin, 126,* 512–529.

Shapiro, D. H. (1985). Clinical use of meditation as a self-regulation strategy: Comments on Holmes's conclusions and implications. *American Psychologist, 40,* 719–722.

Shapiro, F. (1995). *Desensitization and reprocessing: Basic principles, protocols, and procedures.* New York, NY: Guilford.

Shapiro, S. L., Astin, J. A., Bishop, S. R., & Cordova, M. (2005). Mindfulness-based stress reduction for health care professionals: Results from a randomized trial. *International Journal of Stress Management, 12,* 64–176.

Shariff, A. F., & Tracy, J. L. (2011). What are emotion expressions for? *Current Directions in Psychological Science, 20*(6), 395–399.

Sharps, M. J., & Wertheimer, M. (2000). Gestalt perspectives on cognitive science and on experimental psychology. *Review of General Psychology, 4,* 315–336.

Shatz, M., Wellman, H. M., & Silber, S. (1983). The acquisition of mental verbs: A systematic investigation of the first reference to mental state. *Cognition, 14,* 301–321.

Shaver, P. R., & Hazan, C. (1993). Adult attachment: Theory and research. In W. Jones & D. Perlman (Eds.), *Advances in personal relationships (Vol. 4),* pp. 29–70. London, UK: Jessica Kingsley.

Shaver, P. R., & Hazan, C. (1994). Attachment. In A. L. Weber & J. H. Harvey (Eds.), *Perspectives on close relationships* (Chapter 6, pp. 110–130). Boston, MA: Allyn & Bacon.

Shaw, P., Eckstrand, K., Sharp, W., Blumenthal, J., Lerch, J. P., Greenstein, D., Clasen, L., Evans, A., Giedd, J., & Rapoport, J. L. (2007). Attention- deficit/hyperactivity disorder is characterized by a delay in cortical maturation. *Proceedings of the National Academy of Sciences, 104,* 19,649–19,654.

Shaw, P., Malek, M., Watson, B., Sharp, W., Evans, A., & Greenstein, D. (2012). Development of cortical surface area and gyrification in attention-deficit/hyperactivity disorder. *Biological Psychiatry, 72*(3), 191–197.

Shaywitz, S. E. (1996, November). Dyslexia. *Scientific American,* 98–104.

Shaywitz, S. E., Shaywitz, B. A., Fletcher, J. M., & Escobar, M. D. (1990). Prevalence of reading disability in boys and girls: Results of the Connecticut Longitudinal Study. *Journal of the American Medical Association, 264,* 998–1002.

Shea, C. (1998, January 30). Why depression strikes more women than men: "Ruminative coping" may provide answers. *The Chronicle of Higher Education,* 14.

Shea, C. (2012, November 2). IQ wars continue with battles over new puzzles. *The Chronicle of Higher Education,* p. A3.

Shedler, J. (2006, Fall). Why the scientist-practitioner split won't go away. *The General Psychologist, 41*(2), 9–10.

Shedler, J. (2010). The efficacy of psychodynamic psychotherapy. *American Psychologist, 65,* 98–109.

Shepard, R. N., & Metzler, J. (1971). Mental rotation of three-dimensional objects. *Science, 171,* 701–703.

Sherif, C. W. (1981, August). *Social and psychological bases of social psychology*. The G. Stanley Hall Lecture on social psychology, presented at the annual convention of the American Psychological Association, Los Angeles, CA.

Sherif, M. (1935). A study of some social factors in perception. *Archives of Psychology, 27,* 187.

Shermer, M. (2006, July). The political brain. *Scientific American, 295*(1), 36.

Sherrer, H. (2008). *Dehumanization is not an option: An inquiry into the exercise of authority against perceived wrongdoers.* Seattle, WA: Justice Institute.

Sherrill, R., Jr. (1991). Natural wholes: Wolfgang Köhler and Gestalt theory. In G. A. Kimble, M. Wertheimer, & C. L. White (Eds.), *Portraits of pioneers in psychology* (pp. 256–273). Washington, DC: American Psychological Association.

Shih, M., Pittinsky, T., & Ambady, N. (1999). Stereotype susceptibility: Identity salience and shifts in quantitative performance. *Psychological Science, 10,* 80–83.

Shimojo, S., & Shams, L. (2001). Sensory modalities are not separate modalities: Plasticity and interactions. *Current Opinion in Neurobiology, 11,* 505–509.

Shiffrin, R. M. (1993). Short-term memory: A brief commentary. *Memory and Cognition, 21*(2), 193–197.

Shiraev, E., & Levy, D. (2001). C*oss-cultural psychology: Critical thinking and contemporary applications.* Boston, MA: Allyn & Bacon.

Shiraev, E., & Levy, D. (2006). *Cross-cultural psychology: Critical thinking and contemporary applications* (3rd ed.). Boston, MA: Allyn & Bacon.

Shizgal, P., & Arvanitogiannis, A. (2003, March 21). Gambling on dopamine. *Science, 299,* 1856–1858.

Shorter, E., & Healy, D. (2007). *Shock therapy: A history of electroconvulsive treatment in mental illness.* New Brunswick, NJ: Rutgers University Press. [See also: Glass, 2001; Holden, 2003; Hollon et al., 2002; Sackheim et al., 2000; Scovern & Kilmann, 1980]

Shrader, B. (2001). Industrial/organizational psychology 2010: A research odyssey. In J. S. Halonen & S. F. Davis (Eds.), *The many faces of psychological research in the 21st century*. Retrieved from http://teachpsych.org/resources/e-books/faces/script/Ch03.htm.

Shu, L. L., Gino, F., & Bazerman, M. H. (2011). Dishonest deed, clear conscience: When cheating leads to moral disengagement and motivated forgetting. *Personality and Social Psychology Bulletin, 37*(3), 330–349.

Shu, L., Mazar, N., Gino, F., Ariely, D., & Bazerman, M. (2012). Signing at the beginning makes ethics salient and decreases dishonest self-reports in comparison to signing at the end. *Proceedings of the National Academy of Sciences, 109*(38), 15197–15200.

Shweder, R. A. (1991). Thinking through cultures. Cambridge, MA: Harvard University Press.

Sieben, L. (2011, January 27). College freshmen report record-low levels of emotional health. *Chronicle of Higher Education.* Retrieved from http://topics.nytimes.com/top/reference/timestopics/subjects/s/sept_11_2001/health_and_environmental_issues/index.html?scp=11&sq=sieben%209/11&st=cse.

Siegel, J. M. (1990). Stressful life events and use of physician services among the elderly: The moderating role of pet ownership. *Journal of Personality and Social Psychology, 58,* 1081–1086.

Siegel, J. M. (2003, November). Why we sleep. *Scientific American, 289,* 92–97.

Siegel, R. K. (1980). The psychology of life after death. *American Psychologist, 35,* 911–931.

Siegler, R. S. (1994). Cognitive variability: A key to understanding cognitive development. *Current Directions in Psychological Science, 3,* 1–5.

Sigelman, C. K., Thomas, D. B., Sigelman, L., & Robich, F. D. (1986). Gender, physical attractiveness, and electability: An experimental investigation of voter biases. *Journal of Applied Social Psychology, 16,* 229–248.

Silveyra, P., & Floros, J. (2012). Air pollution and epigenetics: Effects on SP-A and innate host defense in the lung. *Swiss Medical Weekly*, *142*, w13579. doi:10.4414/smw.2012.13579

Silver, R. L. (1983). Coping with an undesirable life event: A study of early reactions to physical disability. *Dissertation Abstracts International, 43,* 3415.

Simeon, D., Gross, S., Guralnik, O., Stein, D. J., Schmeidler, J., & Hollander, E. (1997). Feeling unreal: 30 cases of *DSM-III-R* depersonalization disorder. *American Journal of Psychiatry, 154,* 1107–1113.

Simeon, D., Guralnik, O., Hazlett, E. A., Spiegel-Cohen, J., Hollander E., & Buchsbaum, M. S. (2000). Feeling unreal: A PET study of depersonalization disorder. *American Journal of Psychiatry, 157,* 1782–1788.

Simon, H. A. (1992). What is an "explanation" of behavior? *Psychological Science, 3,* 150–161.

Simons, D. J., & Levin, D. T. (1998). Failure to detect changes to people during a real-world interaction. *Psychonomic Bulletin & Review, 4,* 644–649.

Simonton, D. K. (2001). Talent development as a multidimensional, multiplicative, and dynamic process. *Current Directions in Psychological Science, 10,* 39–43.

Simpson, J. A. (1990). The influence of attachment styles on romantic relationships. *Journal of Personality and Social Psychology, 59,* 971–980.

Simpson, J. A., & Harris, B. A. (1994). Interpersonal attraction. In A. L. Weber & J. H. Harvey (Eds.), *Perspectives on close relationships* (pp. 45–66). Boston, MA: Allyn & Bacon.

Sinclair, R. C., Hoffman, C., Mark, M. M., Martin L. L., & Pickering, T. L. (1994). Construct accessibility and the misattribution of arousal: Schacter and Singer revisited. *Psychological Sciences, 5,* 15–18.

Singer, J. L. (1966). *Daydreaming: An introduction to the experimental study of inner experience.* New York, NY: Random House.

Singer, J. L. (1975). Navigating the stream of consciousness: Research in daydreaming and related inner experience. *American Psychologist, 30,* 727–739.

Singer, J. L., Singer, D. G., & Rapaczynski, W. S. (1984). Family patterns and television viewing as predictors of children's beliefs and aggression. *Journal of Communication, 34,* 73–89.

Singer, J. L., & McCraven, V. J. (1961). Some characteristics of adult daydreaming. *Journal of Psychology, 51,* 151–164.

Singer, T., Seymour, B., O'Doherty, J., Kaube, H., Dolan, R. J., & Frith, C. D. (2004, February 20). Empathy for pain involves the affective but not sensory components of pain. *Science, 303,* 1157–1162.

Singhal, A., & Rogers, E. M. (2002). A theoretical agenda for entertainment—Education. *Communica tion Theory, 12*(2), 117–135.

Singleton, J. L., & Newport, E. L. (2004). When learners surpass their models: The acquisition of American Sign Language from inconsistent input. *Cognitve Psychology, 49,* 370–407.

Sinha, G. (2005, July). Training the brain. *Scientific American, 293*(1), 22–23.

Skinner, B. F. (1948). *Walden Two.* Indianapolis, IN: Hackett Publishing Company.

Skinner, B. F. (1953). Some contributions of an experimental analysis of behavior to psychology as a whole. *American Psychologist, 8,* 69–78.

Skinner, B. F. (1956). A case history in scientific method. *American Psychologist, 11,* 221–233. (Reprinted in S. Koch [Ed.], *Psychology: A study of a science* [Vol. 2, pp. 359–379]. New York, NY: McGraw-Hill.)

Skinner, B. F. (1987). Whatever happened to psychology as the science of behavior? *American Psychologist, 42,* 780–786.

Skinner, B. F. (1989). The origins of cognitive thought. *American Psychologist, 44,* 13–18.

Skinner, B. F. (1990). Can psychology be a science of mind? *American Psychologist, 45,* 1206–1210. [See also: Skinner, 1987.]

Skinner, E. A. (1996). A guide to constructs of control. *Journal of Personality and Social Psychology, 71,* 549–570.

Skogli, E. W., Teicher, M. H., Andersen, P. N., Hovik, K. T., & Oie, M. (2013). ADHD in girls and boys—gender differences in co-existing symptoms and executive function measure. *BMC Psychiatry, 13,* 298. doi: 10.1186/1471-244X-13-298

Skoog, I., Nilsson, L., Palmertz, B., Andreasson, L. A., & Svanborg, A. (1993). A population-based study of dementia in 85-year-olds. *New England Journal of Medicine, 328,* 153.

Skotko, B. G., Kensinger, E. A., Locascio, J. J., Einstein, G., Rubin, D. C., Tupler, L. A., . . . Corkin, S. (2004). Puzzling thoughts for H. M.: Can new semantic information be anchored to old semantic memories? *Neuropsychology, 18,* 756–769.

Slater, L. (2005). *Opening Skinner's box: Great psychological experiments of the twentieth century.* New York, NY: W. W. Norton.

Slavich, G. M., & Irwin, M. R. (2014). From stress to inflammation and major depressive disorder: A social signal transduction theory of depression. *Psychological Bulletin, 140,* 774–815.

Slavich, G. M., O'Donovan, A., Epel, E. S., & Kemeny, M. E. (2010a). Black sheep get the blues: A psychobiological model of social rejection and depression. *Neuroscience and Biobehavioral Reviews, 35,* 39–45.

Slavich, G. M., Tartter, M. A., Brennan, P. A., & Hammen, C. (2014). Endogenous opioid system influences depressive reactions to socially painful targeted rejection life events. *Psychoneuroendocrinology, 49,* 141–149.

Slavich, G. M., Thornton, T., Torres, L. D., Monroe, S. M., & Gotlib, I. H. (2009). Targeted rejection predicts hastened onset of major depression. *Journal of Social and Clinical Psychology, 28,* 223–243.

Slavich, G. M., Way, B. M., Eisenberger, N. I., & Taylor, S. E. (2010b). Neural sensitivity to social rejection is associated with inflammatory responses to social stress. *Proceedings of the National Academy of Sciences of the United States of America, 107,* 14817–14822.

Sleek, S. (1994, April). Could Prozac replace demand for therapy? *APA Monitor,* 28.

Slobin, D. I. (1985a). Introduction: Why study acquisition crosslinguistically? In D. I. Slobin (Ed.), *The crosslinguistic study of language acquisition. Vol. 1: The data* (pp. 3–24). Hillsdale, NJ: Erlbaum.

Slobin, D. I. (1985b). Cross-linguistic evidence of the language making capacity. In D. I. Slobin (Ed.), *The crosslinguistic study of language acquisition. Vol. 2: Theoretical issues* (pp. 1157–1256). Hillsdale, NJ: Erlbaum.

Slyper, A. H. (2006). The pubertal timing controversy in the USA, and a review of the possible causative factors for the advance in timing of onset of puberty. *Clinical Endocrinology, 65,* 1–8.

Smith, A. W. (1995). Separation-individuation and coping: Contributions to freshman college adjustment. Unpublished doctoral dissertation, University of North Carolina at Greensboro. *Dissertation Abstracts International, 56,* 3-A, 0831.

Smith, B. L. (2012, June). Inappropriate prescribing. *Monitor on Psychology, 43*(6), 36.

Smith, C. (2004). Consolidation enhancement: Which stages for which tasks? *Behavior and Brain Sciences, 28,* 83–84.

Smith, C. A., & Ellsworth, P. C. (1987). Patterns of appraisal and emotion related to taking an exam. *Journal of Personality and Social Psychology, 52,* 475–488.

Smith, D. (2001, October). Sleep psychologists in demand. *Monitor on Psychology,* 36–39.

Smith, D. (2002a, January). Guidance in treating ADHD. *Monitor on Psychology, 33*(1), 34–35. [See also: Angold et al., 2000; Marshall, 2000.]

Smith, D. (2002b). The theory heard "round the world." *Monitor on Psychology, 33*(9), 30–32.

Smith, D. (2003a, January). Five principles for research ethics. *Monitor on Psychology, 34*(1), 56–60.

Smith, D. (2003b). *Report from Ground Zero.* New York, NY: Penguin.

Smith, E. E. (2000). Neural bases of human working memory. *Current Directions in Psychological Science, 9,* 45–49.

Smith, E. E., & Jonides, J. (1999, March 12). Storage and executive processes in the frontal lobes. *Science, 283,* 1657–1661.

Smith, E. E., & Medin, D. L. (1981). *Cognitive Science Series: 4. Categories and concepts.* Cambridge, MA: Harvard University Press.

Smith, G. B., Schwebel, A. I., Dunn, R. L., & McIver, S. D. (1993). The role of psychologists in the treatment, management, and prevention of chronic mental illness. *American Psychologist, 48,* 966–971.

Smith, G. T., Spillane, N. S., & Annus, A. M. (2006). Implications of an emerging integration of universal and culturally specific psychologies. *Perspectives on Psychological Science, 1,* 211–233. [See also: Matsumoto, 1994, 1996]

Smith, M. L., & Glass, G. V. (1977). Meta-analysis of psychotherapy outcome studies. *American Psychologist, 32,* 752–760.

Smyke, A. T., Zeanah, C. H., Fox, N. A., Nelson, C. A., & Guthrie, D. (2010). Placement in foster care enhances quality of attachment among young institutionalized children. *Child Development, 81*(1), 212–223. doi:10.1111/j.1467-8624.2009.01390.x

Smythe, J. (1998). Written emotional expression: Effect sizes, outcome types, and moderator variables. *Journal of Consulting and Clinical Psychology, 66,* 174–184.

Snow, C. P. (1998). *The two cultures.* Cambridge, England: Cambridge University Press.

Soeter, M., & Kindt, M. (2010). Dissociating response systems: erasing fear from memory. *Neurobiology of Learning and Memory, 94*(1), 30–41.

Solms, M. (2004, May). Freud returns. *Scientific American, 17*(2), 28–35.

Solms, M. (2006). Freud returns, *Scientific American Mind, 17* (2), 28–35.

Solso, R. L. (2001). *Cognitive psychology* (6th ed.). Boston, MA: Allyn & Bacon.

Sommer, I. E. C., Aleman, A., Bouma, A., & Kahn, R. S. (2004). Do women really have more bilateral language representation than men? A meta-analysis of functional imaging studies. *Brain: A Journal of Neurology, 127,* 1845–1852.

Sow, I. (1977). *Psychiatrie dynamique africaine.* Paris, France: Payot.

Sparling, J. W., Van Tol, J., & Chescheir, N. C. (1999). Fetal and neonatal hand movement. *Physical Therapy, 79,* 24–39.

Spear, L. P. (2000). Neurobehavioral changes in adolescence. *Current Directions in Psychological Science, 9,* 111–114.

Spearman, C. (1927). *The abilities of man.* New York, NY: Macmillan.

Spelke, E. S. (2000). Core knowledge. *American Psychologist, 55,* 1233–1243.

Spence, C. (2011) Crossmodal correspondences: A tutorial review. *Attention, Perception, and Psychophysics, 73,* 971–995. doi: 10.3758/s13414-010-0073-7

Spencer, R. M. C., Zelaznik, H. N., Diedrichsen, J., & Ivry, R. B. (2003, May 30). Disrupted timing of discontinuous but not continuous movements by cerebellar lesions. *Science, 300,* 1437–1439.

Spencer, T. J., Biederman, J., Faraone, S. V., Madras, B. K., Bonab, A. A., Dougherty, D. D., . . . Fischman, A. J. (2013). Functional genomics of attention-deficit/hyperactivity disorder (ADHD) risk alleles on dopamine transporter binding in ADHD and healthy control subjects. *Biological Psychiatry, 74*(2), 84–89.

Sperling, G. (1960). The information available in brief visual presentations. *Psychological Monographs, 74,* 1–29.

Sperling, G. (1963). A model for visual memory tasks. *Human Factors, 5,* 19–31.

Sperry, R. W. (1964). The great cerebral commissure. *Scientific American, 210,* 42–52.

Sperry, R. W. (1968). Mental unity following surgical disconnection of the cerebral hemispheres. *The Harvey Lectures, Series 62.* New York, NY: Academic Press.

Sperry, R. W. (1982). Some effects of disconnecting the cerebral hemispheres. *Science, 217,* 1223–1226.

Spiegel, A. (2008). Old-fashioned play builds serious skills. NPR, February 21, 2008. Retrieved from www.npr.org/templates/story/story.php?storyId=19212514&ps=rs.

Spiegel, D., & Cardeña, E. (1991). Disintegrated experience: The dissociate disorders revisited. *Psychological Bulletin, 100,* 366–378.

Spinweber, C. (1990). *Insomnias and parasomnias in young adults.* Paper presented to the annual meeting of the Western Psychological Association, Los Angeles, CA.

Spiro, R. J. (1980). Accomodative reconstruction in prose recall. *Journal of Verbal Learning and Verbal Behavior, 19,* 84–95.

Spitz, R. A. (1946). Hospitalism: A follow-up report on investigation described in Volume I, 1945. *The Psychoanalytic Study of the Child, 2,* 113–117.

Spitzer, R. L. (1973). On pseudoscience in science, logic in remission, and psychiatric diagnosis: A critique of Rosenhan's "On being sane in insane places." *Journal of Abnormal Psychology, 84,* 442–452.

Spitzer, R. L., Gibbon, M., Skodol, A. E., Williams, J. B. W., & First, M. B. (1989). *DSM-III-R case-book.* Washington, DC: American Psychiatric Press.

Spitzer, R. L., Lilienfeld, S. O., & Miller, M. B. (2005). Rosenhan revisited: The scientific credibility of Lauren Slater's pseudopatient diagnosis study. *Journal of Nervous and Mental Disease, 193,* 734–739.

Sprang, G. (1999). Post-disaster stress following the Oklahoma City bombing: An examination of three community groups. *Journal of Interpersonal Violence, 14,* 169.

Sprecher, S., Barbee, A., & Schwartz, P. (1995). "Was it good for you, too?": Gender differences in first sexual intercourse experiences. *Journal of Sex Research, 32,* 3–15.

Springen, K. (2010, January/February). Daring to die. *Scientific American Mind, 20*(7), 40–47.

Sprock, J., & Blashfield, R. K. (1991). Classification and nosology. In M. Hersen, A. E. Kazdin, & A. S. Bellack (Eds.), *The clinical psychology handbook* (2nd ed., pp. 329–344). New York, NY: Pergamon Press.

Squier, L. H., & Domhoff, G. W. (1998). The presentation of dreaming and dreams in introductory psychology textbooks: A critical examination with suggestions for textbook authors and course instructors. *Dreaming: Journal of the Association for the Study of Dreams, 8,* 149–168.

Squire, L. R. (2007, April 6). Rapid consolidation. *Science, 316,* 57–58. [See also Balter, 2000; Beardsley, 1997; Bilkey, 2004; Fyhn et al., 2004; Haberlandt, 1999; Heyman, 2006; Kandel, 2001; Leutgeb et al., 2004; McGaugh, 2000; Travis, 2000a.]

Srivastava, S., John, O. P., Gosling, S. D., Potter, J. (2003). Development of personality in early and middle adulthood: Set like plaster or persistent change? *Journal of Personality and Social Psychology, 84,* 1041–1053.

St. George-Hyslop, P. H. (2000). Piecing together Alzheimer's. *Scientific American, 283*(6), 76–83. [See also: Morrison-Bogorad & Phelps, 1997; Plomin et al., 1994; Skoog et al., 1993.]

Stahl, S. A. (1999, Fall). Different strokes for different folks? A critique of learning styles. *American Educator, 23*(3), 27–31.

Stambor, Z. (2006, November). The forgotten population: Psychologists are testing telehealth and home-based health-care interventions to turn around a mental health crisis among elderly Americans in rural areas. *Monitor on Psychology, 37*(10), 52–53.

Staples, S. L. (1996). Human response to environmental noise: Psychological research and public policy. *American Psychologist, 51,* 143–150.

Starr, A., Libertus, M. E., & Brannon, E. M. (2013). Number sense in infancy predicts mathematical abilities in childhood. *Proceedings of the National Academy of Science, 110,* 18116–18120.

Starr, C. R., & Ferguson, G. M. (2012). Sexy dolls, sexy grade-schoolers? Media & maternal influences on young girls' self-sexualization. *Sex Roles, 67,* 463–476.

Stavish, S. (1994, Fall). Breathing room. *Stanford Medicine, 12*(1), 18–23.

Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist, 52,* 613–629.

Steele, C. M., Spencer, S. J., & Aronson, J. (2002). Contending with group image: The psychology of stereotype and social identity threat. In M. P. Zanna (Ed.), *Advances in experimental social psychology, Vol. 34* (pp. 379–440). San Diego, CA: Academic Press.

Steele, K. M., Bass, K. E., & Crook, M. D. (1999). The mystery of the Mozart effect: failure to replicate. *Psychological Science, 10,* 366–369.

Steele, K., & Johnson, C. (2009, April/May). Ask the brains. *Scientific American Mind, 20*(2), 70. [See also Campbell & Murphy, 1998; Oren & Terman, 1998.]

Steinberg, L. D., & Silk, J. S. (2002). Parenting adolescents. In M. H. Bornstein (Ed.) *Handbook of parenting* (Vol. 1, pp. 103–134). Mahwah, NJ: Erlbaum.

Steiner-Adair, C., & Barker, T. H. (2014). *The big disconnect: Protecting childhood and family relationships in the digital age.* New York, NY: HarperCollins.

Steketee, G., & Barlow, D. H. (2002). Obsessive compulsive disorder. In D. H. Barlow (Ed.), *Anxiety and its disorders* (2nd ed., pp. 516–550). New York, NY: Guilford.

Stern, J. A., Brown, M., Ulett, G. A., & Sletten, I. (1977). A comparison of hypnosis, acupuncture, morphine, valium, aspirin, and placebo in the management of experimentally induced pain. *Annals of the New York Academy of Sciences, 296,* 175–193.

Sternberg, R. J. (1994). A triarchic model for teaching and assessing students in general psychology. *The General Psychologist, 30,* 42–48.

Sternberg, R. J. (1998). *Cupid's arrow: The course of love through time.* New York, NY: Cambridge University Press.

Sternberg, R. J. (1999). The theory of successful intelligence. *Review of General Psychology, 3,* 292–316.

Sternberg, R. J. (2000). Implicit theories of intelligence as exemplar stories of success: Why intelligence test validity is in the eye of the beholder. *Psychology, Public Policy, and Law, 6,* 159–167.

Sternberg, R. J. (2001). What is the common thread of creativity? Its dialectical relation to intelligence and wisdom. *American Psychologist, 56,* 360–362.

Sternberg, R. J. (2003a). *Wisdom, intelligence, and creativity synthesized.* Cambridge, England: Cambridge University Press.

Sternberg, R. J. (2003b). It's time for prescription privileges. *Monitor on Psychology, 34*(6), 5.

Sternberg, R. J. (2004). Culture and intelligence. *American Psychologist, 59,* 325–338. [See also: Kleinfeld, 1994; Neisser et al., 1996; Rogoff, 1990; Segall et al., 1999; Serpell, 1994]

Sternberg, R. J. (2007). Assessing what matters. *Informative Assessment, 65*(4), 20–26.

Sternberg, R. J., & Grigorenko, E. L. (1997). Are cognitive styles still in style? *American Psychologist, 52,* 700–712.

Sternberg, R. J., Grigorenko, E. L., & Kidd, K. K. (2005). Intelligence, race, and genetics. *American Psychologist, 60,* 46–59. [See also: Chorney et al., 1998; McClearn et al., 1997; Neisser et al., 1996; Petrill et al., 1998; Plomin, 1989; Scarr, 1998.]

Sternberg, R. J., & the Rainbow Project Collaborators. (2006). The Rainbow Project: Enhancing the SAT through assessments of analytical, practical, and creative skills. *Intelligence, 34*(4), 321–350.

Sternberg, R. J., & Lubart, T. I. (1991). An investment theory of creativity and its development. *Human Development, 34,* 1–31.

Sternberg, R. J., Wagner, R. K., Williams, W. M., & Horvath, J. A. (1995). Testing common sense. *American Psychologist, 50,* 912–927.

Stevenson, H. W., Chen, C., & Lee, S. Y. (1993). Mathematics achievement of Chinese, Japanese, and American children: Ten years later. *Science, 259,* 53–58.

Stewart, V. M. (1973). Tests of the "carpentered world" hypothesis by race and environment in America and Zambia. *International Journal of Psychology, 8,* 83–94.

Stickgold, R. (2011). Memory in sleep and dreams: The construction of meaning. In S. Nalbantian, P. M. Matthews, & J. L. McClelland (Eds.), *The memory process: Neuroscientific and humanistic perspectives.*

Stickgold, R., & Walker, M. (2004). To sleep, perchance to gain creative insight? *Trends in Cognitive Sciences, 85*(5), 191–192.

Stix, G. (2008, August). Lighting up the lies. *Scientific American, 229,* 18, 20.

Stock, M. B., & Smythe, P. M. (1963). Does under-nutrition during infancy inhibit brain growth and subsequent intellectual development? *Archives of Disorders in Childhood, 38,* 546–552.

Stone, A. A., Schwartz, J. E., Broderick, J. E., & Deaton, A. (2010). A snapshot of the age distribution of psychological well-being in the United States. *Proceedings of the National Academy of Sciences, USA,* published online May 17, 2010. Retrieved from www.pnas.org/content/early/2010/05/04/1003744107.full.pdf+html.

Stone, J., Lynch, C. I., Sjomeling, M., & Darley, J. M. (1999). Stereotype threat effects on Black and White athletic performance. *Journal of Personality and Social Psychology, 77,* 1213–1227.

Ströhle, A. (2009). Physical activity, exercise, depression and anxiety disorders. *Journal of Neural Transmission, 116,* 777–784. doi: 10.1007/s00702-008-0092-x.

Strasburger, V. C. (1995). *Adolescents and the media.* Thousand Oaks, CA: Sage.

Strauss, E. (1998). Writing, speech separated in split brain. *Science, 280,* 827.

Strayer, D. L., Drews, F. A., & Johnston, W. A. (2003). Cell phone-induced failures of visual attention during simulated driving. *Journal of Experimental Psychology: Applied, 9,* 23–32.

Strick, M. v. B., Holland, R. B., & van Knippenberg, R. W. (2009). Humor in advertisements enhances product liking by mere association. *Journal of Experimental Psychology: Applied, 15*(1), 35–45.

Strickland, B. R. (2000). Misassumptions, misad-ventures, and the misuse of psychology. *American Psychologist, 55,* 331–338.

Striegel-Moore, R. H., & Bulik, C. M. (2007). Risk factors for eating disorders. *American Psychologist, 62,* 181–198.

Striegel-Moore, R. H., Silberstein, L. R., & Rodin, J. (1993). The social self in bulimia nervosa: Public self-consciousness, social anxiety, and perceived fraudulence. *Journal of Abnormal Psychology, 102,* 297–303.

Strobel, C., Hunt, S., Sullivan, R., Sun, J., & Sah, P. (2014, April). Emotional regulation of pain: the role of noradrenaline in the amygdala. *Science China: Life Sciences, 57*(4), 384–390. doi: 10.1007/s11427-014-4638-x

Stromeyer, C. F., & Psotka, J. (1970). The detailed texture of eidetic images. *Nature, 225,* 346–349.

Stuart, R. B., & Lilienfeld, S. O. (2007). The evidence missing from evidence-based practice. *American Psychologist, 62,* 615–616.

Styron, W. (1990). *Darkness visible: A memoir of madness.* New York, NY: Random House.

Substance Abuse and Mental Health Services Administration. (2009). *Many baby boomers are continuing illicit drug use into their later years according to new analytic publication.* Office of Applied Studies, August 19, 2009. Retrieved from www.samhsa.gov/newsroom/advisories/0908182855.aspx.

Substance Abuse and Mental Health Services Administration. (2010). *Results from the 2009 National Survey on Drug Use and Health: Volume I. Summary of National Findings* (Office of Applied Studies, NSDUH Series H-38A, HHS Publication No. SMA 10-4586 Findings). Rockville, MD.

Sue, S. (1983). *The mental health of Asian Americans.* San Francisco, CA: Jossey-Bass.

Sue, S. (1991). Ethnicity and culture in psychological research and practice. In J. D. Goodchilds (Ed.), *Psychological perspectives on human diversity in America* (pp. 47–86). Washington, DC: American Psychological Association.

Sue, S., & Okazaki, S. (1990). Asian-American educational achievements: A phenomenon in search of an explanation. *American Psychologist, 45,* 913–920.

Sugarman, L. (2001). *Life-span development. Frameworks, accounts, and strategies* (2nd ed.). East Sussex, UK: Psychology Press.

Sulloway, F. J. (1992). *Freud, biologist of the mind: Beyond the psychoanalytic legend.* Cambridge, MA: Harvard University Press.

Sulloway, F. J. (1996). *Born to rebel: Birth order, family dynamics and creative lives.* New York, NY: Pantheon Books.

Sulloway, F. J., & Zweigenhaft, R. (2010). Birth order and risk taking in athletics: A meta-analysis and study of major league baseball. *Personality and Social Psychology Review, 14,* 402–416.

Suls, J., & Marco, C. A. (1990). Relationship between JAS- and FTAS-Type A behavior and non-CHD illness: A prospective study controlling for negative affectivity. *Health Psychology, 9,* 479–492.

Suls, J., & Sanders, G. S. (1988). Type A behavior as a general risk factor for physical disorder. *Journal of Behavioral Medicine, 11,* 201–226.

Susman, E. (2012, June 14). CPAP may ease depression. *Medpage Today.* Retrieved from http://www.medpagetoday.com/MeetingCoverage/APSS/33280

Swann, W. B., Jr., Hixon, J. G., & De La Ronde, C. (1992). Embracing the bitter "truth": Negative self-concepts and marital commitment. *Psychological Science, 3,* 118–121.

Swanson, J. M., Elliott, G. R., Greenhill, L. L., Wigal, T., Arnold, L. E., Vitiello, B., et al. (2007a). Effects of stimulant medication on growth rates across 3 years in the MTA follow-up. *Journal of the American Academy of Child and Adolescent Psychiatry, 46,* 1015–1927.

Swanson, J. M., Hinshaw, S. P., Arnold, L. E., Gibbons, R. D., Marcus, S., HUR, K., et al. (2007b). Secondary evaluations of MTA 36-month outcomes: Propensity score and growth mixture model analyses. *Journal of the American Academy of Child and Adolescent Psychiatry, 46,* 979–988.

Sweldens, S., Van Osselaer, S. M. J., & Janiszewski, C. (2010). Evaluative conditioning procedures and the resilience of conditioned brand attitudes. *Journal of Consumer Research, 37*(3), 473–489.

Swets, J. A., & Bjork, R. A. (1990). Enhancing human performance: An evaluation of "new age" techniques considered by the U.S. Army. *Psychological Science, 1,* 85–96.

Symond, M. B., Harris, A. W. F., Gordon, E., & Williams, L. M. (2005), "Gamma synchrony" in first-episode schizophrenia:

A disorder of temporal connectivity? *American Journal of Psychiatry, 162,* 459–465.

Szasz, T. S. (1961). *The myth of mental illness.* New York, NY: Harper & Row.

Szasz, T. S. (1977). *The manufacture of models.* New York, NY: Dell.

Tait, R., & Silver, R. C. (1989). Coming to terms with major negative life events. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 357–381). New York, NY: Guilford Press.

Talarico, J. M., & Rubin, D. C. (2003). Confidence, not consistency, characterizes flashbulb memories. *Psychological Science, 14,* 465–461.

Talhelm, T., Zhang, X., Oishi, S., Shimin, C., Duan, D., Lan, X., & Kitayama, S. (2014). Large-scale psychological differences within China explained by rice versus wheat agriculture. *Science, 344*(6184), 603–608. doi: 10.1126/science.1246850

Tamres, L., Janicke, D., & Helgeson, V. S. (2002). Sex diffferences in coping behavior: A meta-analytic review. *Personality and Social Psychology Review, 6,* 2–30.

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72,* 271–324.

Taub, A. H., & Mintz, M. (2010). Amygdala conditioning modulates sensory input to the cerebellum. *Neurobiology of Learning and Memory, 94*(4), 521–529.

Tavris, C. (1989). *Anger: The misunderstood emotion.* New York, NY: Touchstone.

Tavris, C. (1991). The mismeasure of woman: Paradoxes and perspectives in the study of gender. In J. D. Goodchilds (Ed.), *Psyc hological perspectives on human diversity in America* (pp. 87–136). Washington, DC: American Psychological Association.

Tavris, C. (1995). From excessive rage to useful anger. *Contemporary Psychology, 40*(11), 1101–1102.

Tavris, C., & Aronson, E. (2007). *Mistakes were made, but not by me.* Orlando, FL: Harcourt.

Taylor, J. B. (2009). *My stroke of insight.* New York, NY: Penguin Books.

Taylor, L. C., Hinton, I. D., & Wilson, M. M. (1995). Parental influences of academic performance in African-American Students. *Journal of Child and Family Studies, 4,* 293–302.

Taylor, L. E., Swerdfeger, A. L., & Eslick, G. D. (2014). Vaccines are not associated with autism: An evidence-based meta-analysis of case-control and cohort studies. *Vaccine, 32*(29), 3623–3629. doi: 10.1016/j.vaccine.2014.04.085

Taylor, L. S., Fiore, A. T., Mendelshon, G. A., & Chesire, C. (2011). "Out of my league:" A real-world test of the matching hypothesis. *Personality and Social Psychology Bulletin, 39,* 456–467.

Taylor, S. E. (1983). Adjusting to threatening events: A theory of cognitive adaptation. *American Psychologist, 38,* 1161–1173.

Taylor, S. E. (1990). Health psychology: The science and the field. *American Psychologist, 45,* 40–50.

Taylor, S. E. (2003). *The tending instinct: Women, men, and the biology of relationships.* New York, NY: Owl Books/Henry Holt.

Taylor, S. E. (1999). *Health psychology.* 4th ed. New York, NY: McGraw-Hill.

Taylor, S. E., Kemeny, M. E., Reed, G. M., Bower, J. E., & Gruenewald, T. L. (2000a). Psychological resources, positive illusions, and health. *American Psychologist, 55,* 99–109.

Taylor, S. E., Klein, L., Lewis, B. P., Gruenewald, T. L., Gurung, R. A. R., & Updegraff, J. A. (2000b). Biobehavioral responses to stress in females: Tend-and-befriend, not fight-or-flight. *Psychological Review, 107,* 411–429.

Teasdale, T. W., & Owen, D. R. (1987). National secular trends in intelligence and education: A twenty-year cross-sectional study. *Nature, 325,* 119–21.

Teasdale, T. W., & Owen, D. R. (2008). Secular declines in cognitive test scores: A reversal of the Flynn effect. *Intelligence, 36,* 121–126.

Tedeschi, R. G., & Calhoun, L. G. (1996). The Post-traumatic Growth Inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress, 9,* 455–471.

Tellegen, A., Lykken, D. T., Bouchard, T. J., Wilcox, K. J., Segal, N. L., & Rich, S. (1988). Personality similarity in twins reared apart and together. *Journal of Personality and Social Psychology, 54,* 1031–1039.

Teller, D. Y. (1998). Spatial and temporal aspects of infant color vision. *Vision Research, 38,* 3275–3282.

Terman, L. M. (1916). *The measurement of intelligence.* Boston, MA: Houghton Mifflin.

Terman, L., & Oden, M. H. (1959). *Genetic studies of genius: Vol. 4. The gifted group at midlife.* Stanford, CA: Stanford University Press.

Terry, K. J., & Tallon, J. (2004). Child Sexual Abuse: A Review of the Literature. Retrieved from www.usccb.org/nrb/john-jaystudy/litreview.pdf.

Terry, W. S. (2000). *Learning and memory: Basic principles, processes, and procedures.* Boston, MA: Allyn & Bacon.

Tesser, A., & Brodie, M. (1971). A note on the evaluation of a "computer date." *Psychonomic Science, 23,* 300.

Thabet, A. A. M., Abed, Y., & Vostanis, P. (2004). Comorbidity of PTSD and depression among refugee children during war conflict. *Journal of Child Psychology and Psychiatry, 45,* 533–542. [See also: Horgan, 1996; Weissman et al., 1996]

Thase, M. E., Greenhouse, J. B., Reynolds F. E. III, Pilkonis, P. A., Hurley, K., Grochocinski, V., & Kupfer, D. J. (1997). Treatment of major depression with psychotherapy or psychotherapy-pharmacotherapy combinations. *Archives of General Psychiatry, 54,* 1009–1015.

The man with two brains. (1997, January 22). *Scientific American Frontiers: Pieces of Mind.* Retrieved from www.pbs.org/saf/transcripts/transcript703.htm.

Thio, A. (1995). *Deviant behavior.* New York, NY: HarperCollins.

Thomas, E. F., McGarty, C., & Louis, W. (2014). Social interaction and psychological pathways to political engagement and extremism. *European Journal of Social Psychology, 44,* 15–20.

Thomas, F. F. (1991). *Impact on teaching: Research with culturally diverse populations.* Symposium conducted at the Western Psychological Association Convention, San Francisco.

Thomas, J., Khan, S., & Abdulrahman, A. A, (2010). Eating attitudes and body image concerns among female university students in the United Arab Emirates. *Appetite, 54*(3), 595–598.

Thompson, D. M. (1988). Context and false recognition. In G. M. Davies & D. M. Thompson (Eds.), *Memory in context: Context in memory* (pp. 285–304). New York, NY: Wiley.

Thompson, J. K. (1986, April). Larger than life. *Psychology Today,* 38–44.

Thompson, M. R., Callaghan, P. D., Hunt, G. E., Cornish, J. L., & McGregor, I. S. (2007). A role for oxytocin and 5-HT(1A) receptors in the prosocial effects of 3,4 methylenedioxymethamphetamine ("ecstasy"). *Neuroscience, 146*(2), 509–514.

Thompson, R., Emmorey, K., & Gollan, T. H. (2005). "Tip of the fingers" experiences by deaf signers: Insights into the organization of a sign-based lexicon. *Psychological Science, 16,* 856–860.

Thompson, R. C., Kulas, J. T., Anderson, M. G., & Arneson, J. J. (2015). The Myers-Briggs Type Indicator in organizational settings: A theoretical review and psychometric analysis. (Under review)

Thompson, W. R., Schellenberg, E. G., & Husain, G. (2001). Arousal, mood, and the Mozart effect. *Psychological Science, 12,* 248–251.

Thomsen, D. K., Mehlsen, M. Y., Hokland, M., Viidik, A., Olesen, F., Avlund, K., . . . Zachariae, R. (2004). Negative thoughts and health: Associations among rumination, immunity, and health care utilization in a young and elderly sample. *Psychosomatic Medicine, 66,* 363–371

Thomson, H. (2015, May 21). Brain implant allows paralysed man to sip a beer at his own pace. *New Scientist.*

Thorpe, S. J., & Fabre-Thorpe, M. (2001, January 12). Seeking categories in the brain. *Science, 291,* 260–263.

Thorsteinsson, E. B., James, J. E., & Gregg, M. E. (1998). Effects of video-relayed social support on hemodynamic reactivity and salivary cortisol during laboratory-based behavioral challenge. *Health Psychology, 17,* 436–444.

Tienari, P., Sorri, A., Lahti, I., Naarala, M., Wahlberg, K.-E., Moring, J., . . . Wynne, L. C. (1987). Genetic and psychosocial factors in schizophrenia: The Finnish adoptive family study. *Schizophrenia Bulletin, 13,* 476–483.

Till, B. D., Stanley, S. M., & Priluck, R., (2008). Classical conditioning and celebrity endorsers: An examination of belongingness and resistance to extinction . *Psychology & Marketing, 25*(2), 179–196.

Tirozzi, G. N., & Uro, G. (1997). Education reform in the United States: National policy in support of local efforts for school improvement. *American Psychologist, 52,* 241–249. [See also: Zigler & Muenchow, 1992; Zigler & Styfco, 1994.]

Todes, D. P. (1997). From the machine to the ghost within: Pavlov's transition from digestive physiology to conditional reflexes. *American Psychologist, 52,* 947–955.

Tolin, D. F., & Foa, E. B. (2006). Sex Differences in Trauma and Post-Traumatic Stress Disorder: A quantitative review of 25 years of research. *Psychological Bulletin, 132,* 959–992.

Tolman, E. C. (1948). Cognitive maps in rats and men. *Psychological Review, 55,* 189–208.

Tolman, E. C., & Honzik, C. H. (1930). "Insight" in rats. *University of California Publications in Psychology, 4,* 215–232.

Tolman, E. C., Ritchie, B. G., & Kalish, D. (1946). Studies in spatial learning: I. Orientation and the shortcut. *Journal of Experimental Psychology, 36,* 13–24.

Toncar, M. F. (2001). The use of humour in television advertising: revisiting the US-UK comparison. *International Journal of Advertising, 20*(4), 521–539.

Toneatto, T., & Nguyen, L. (2007). Does mindfulness meditation improve anxiety and mood symptoms? A review of the controlled research. *The Canadian Journal of Psychiatry, 52,* 260–266.

Tononi, G., & Edelman, G. M. (1998, December 4). Consciousness and complexity. *Science, 282,* 1846–1850.

Torabi, M. R., & Seo, D. C. (2004). National study of behavioral and life changes since September 11. *Health Education Behavior, 31,* 179–192.

Torrey, E. F. (1996). *Out of the shadows: Confronting America's mental illness crisis.* New York, NY: Wiley.

Torrey, E. F. (1997). The release of the mentally ill from institutions: A well-intentioned disaster. *The Chronicle of Higher Education,* B4–B5.

Totterdell, P. (2000). Catching moods and hitting runs: Mood linkage and subjective performance in professional sport. *Journal of Applied Psychology, 85,* 848–859.

Totterdell, P., Kellett, S., Briner, R. B., & Teuchmann, K. (1998). Evidence of mood linkage in work groups. *Journal of Personality and Social Psychology, 74,* 1504–1515.

Tracy, J. L., & Robins, R. W. (2004). Show your pride: Evidence for a discrete emotion expression. *Psychological Science, 15,* 194–197.

Trainor, L. J. (2005). Are there critical periods for musical development? *Developmental Psychobiology, 46,* 262–278.

Travis, J. (2004, January 17). Fear not. *Science News, 165,* 42–44.

Treffert, D. A., & Wallace, G. L. (2002, June). Islands of genius. *Scientific American, 286,* 76–85.

Trei, L. (2007, February 7). Fixed versus growth intelligence mindsets: It's all in your head, Dweck says. Stanford University News Service. Retrieved from http://news.stanford.edu/pr/2007/pr-dweck-020707.html

Triandis, H. (1989). The self and social behavior in differing cultural contexts. *Psychological Review, 96,* 506–520.

Triandis, H. (1990). Cross-cultural studies of individualism and collectivism. In J. Berman (Ed.), *Nebraska Symposium on Motivation, 1989* (pp. 42–133). Lincoln: University of Nebraska Press.

Triandis, H. C. (1994). *Culture and social behavior.* New York: McGraw-Hill.

Triandis, H. C. (1995). *Individualism & collectivism.* Boulder, CO: Westview Press. [See also: Triandis, 1989, 1990, 1994; Triandis & Gelfand, 1998]

Triandis, H. C., & Gelfand, M. J. (1998). Converging measurement of horizontal and vertical individualism and collectivism. *Journal of Personality and Social Psychology, 74,* 118–128.

Troncoso, X. G., Macknik, S. L., Otero-Millan, J., & Martinez-Conde, S. (2008, October 14). Microsaccades drive illusory motion in the *Enigma* illusion. *Proceedings of the National Academy of Sciences, 105*(41), 16033–16038. Retrieved from http://www.pnas.org/content/105/41/16033.full

Tronick, E., Als, H., & Brazelton, T. B. (1980). Moradic phases: A structural description analysis of infant-mother face to face interaction. *Merrill-Palmer Quarterly, 26,* 3–24.

Trope, I., Rozin, P., Nelson, D. K., & Gur, R. C. (1992). Information processing in separated hemispheres of the callosotomy patients: Does the analytic–holistic dichotomy hold? *Brain and Cognition, 19,* 123–147.

Tsai, M., & Uemura, A. (1988). Asian Americans: the struggles, the conflicts and the successes. In P. Bronstein and K. Quina (Eds.), *Teaching the psychology of people: Resources for gender and sociocultural awareness,* Washington, DC: American Psychological Association.

Tse, D., Langston, R. F., Kakeyama, M., Bethus, I., Spooner, P. A., Wood, E. R., . . . Morris, R. G. M. (2007, April 6). Schemas and memory consolidation. *Science, 316,* 76–82.

Tsao, D. (2006, October 6). A dedicated system for processing faces. *Science, 314,* 72–73. [See also: Downing et al., 2001; Holden, 1997; Tsao et al., 2006; Turk et al., 2002)

Tsao, D. Y., Freiwald, W. A., Tootell, R. B. H., & Livingstone, M. S. (2006, February 3). A cortical region consisting entirely of face-selective cells. *Science, 311,* 670–674.

Tulving, E. (1983). *Elements of episodic memory.* Oxford, U.K.: Clarendon Press.

Turin, L. (2006). *The secret of scent: Adventures in perfume and the science of smell.* New York, NY: Ecco. [See also: Mombaerts, 1999.]

Turk, D. C. (1994). Perspectives on chronic pain: The role of psychological factors. *Current Directions in Psychological Science, 3,* 45–48.

Turk, D. J., Heatherton, T. F., Kelly, W. M., Funnell, M. G., Gazzaniga, M. S., & Macrae, C. N. (2002, September 1). Mike or me? Self-recognition in a split-brain patient. *Nature Neuroscience, 5,* 841–842.

Turkheimer, E., Haley, A., Waldron, M., D'Onofrio, B., & Gottesman, I. I. (2003). Socioeconomic status modifies heritability of IQ in young children. *Psychological Science, 14,* 623–628.

Turkington, C. (1993, January). New definition of retardation includes the need for support. *APA Monitor,* 26–27.

Turner, E. H., Matthews, A. M., Linardatos, E., Tell, R. A., & Rosenthal, R. (2008, January 17). Selective publication of antidepressant trials and its influence on apparent efficacy. *New England Journal of Medicine, 358,* 252–260.

Turner, J. C., & Oakes, P. J. (1989). Self-categorization theory and social influence. In P. B. Paulus (Ed.), *Psychology of group influence* (2nd ed.). Hillsdale, NJ: Erlbaum.

Turvey, M. T. (1996). Dynamic touch. *American Psychologist, 51,* 1134–1152.

Twin Oaks Intentional Community Homepage. (2016). Retrieved from http://www.twinoaks.org

Tyler, L. (1988). Mental testing. In E. R. Hilgard (Ed.), *Fifty years of psychology* (pp. 127–138). Glenview, IL: Scott, Foresman.

Ulrich, R. E., & Azrin, N. H. (1962). Reflexive fighting in response to aversive stimulation. *Journal of the Experimental Analysis of Behavior, 5,* 511–520.

Underdown, A., Barlow, J., Chung, V., & Stewart-Brown, S. (2006). Massage intervention for promoting mental and physical health in infants aged under six months. *Cochrane Database of Systematic Reviews 18*(4), CD005038.

Underwood, E. (2014, October 22). Neuroscientists speak out against brain game hype. *Science.* Retrieved from http://news.sciencemag.org/brain-behavior/2014/10/neuroscientists-speak-out-against-brain-game-hype

University of Waterloo. (2014, December 8). Each dollar spent on kids' nutrition can yield more than $100 later. *ScienceDaily.* Retrieved from www.sciencedaily.com/releases/2014/12/141208170758.htm

U.S. Bureau of the Census. (2002). *Statistical abstract of the United States* (122nd ed.). Washington, DC: U.S. Government Printing Office.

U.S. Bureau of the Census. (2011). *Statistical abstracts of the United States. Table 227.* Washington, DC: U.S. Government Printing Office.

U.S. Department of Energy. (2013). FDA approves first bionic eye for the blind. Retrieved from http://www.energy.gov/articles/fda-approves-first-bionic-eye-blind

U.S. Department of Health and Human Services. (2001). *Mental health: culture, race, and ethnicity: A supplement to Mental Health—A Report of the Surgeon General.* Rockville, MD: Author. Retrieved from http://www.ncbi.nlm.nih.gov/books/NBK44243/

U.S. Department of Health and Human Services. (2002). *Hospitalization in the United States, 2002.* Retrieved from http://ahrq.gov/data/hcup/factbk6/factbk6b.htm#common.

U.S. Department of Health and Human Services. (2008). *2008 physical activity guidelines for Americans summary*. Retrieved from http://www.health.gov/paguidelines/guidelines/summary.aspx

U.S. Department of Health and Human Services. (2011). Head Start Program Information Report for the 2009–2010 Program Year, National Level Survey Summary Report.

U.S. Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau. (2009). *Child health USA 2008–2009.* Rockville, MD: U.S. Department of Health and Human Services.

U.S. Department of Justice. (1999). *Eyewitness Evidence: A Guide for Law Enforcement.* Retrieved from www.ncjrs.gov/pdffiles1/nij/178240.pdf.

U.S. Fish and Wildlife Service (2013). *Mexican Wolf Recovery Program: Progress report no. 15. Reporting period: January 1–December 31, 2012.* Retrieved from https://www.fws.gov/southwest/es/mexicanwolf/pdf/2012_MW_Progress_Report_Final_w_Addendum.pdf

U.S. Senate Select Committee on Intelligence. (2004). *Report on the U.S. Intelligence Community's Prewar Intelligence Assessments on Iraq: Conclusions.* Retrieved from http://intelligence.senate.gov/conclusions.pdf.

*USA Today.* (1996, December). College freedom can trigger illness. *125*(1), 7.

Usart, M., & Romero, M. (2014). Spanish Zimbardo Time Perspective Inventory construction and validity among higher education Students. *Electronic Journal of Research in Educational Psychology*, 12(2).

*USMagazine.com.* (2010, January 29). Christina Applegate "did a 180" after beating cancer. Retrieved from www.usmagazine.com/healthylifestyle/news/christina-applegate-did-a-180-after-cancer-2010291.

Vaillant, G. E. (1990). Avoiding negative life outcomes: Evidence from a forty-five year study. In P. B. Baltes & M. M. Baltes (Eds.), *Successful aging: Perspectives from the behavioral sciences*. Cambridge, MA: Cambridge University Press.

Valenstein, E. S. (Ed.). (1980). *The psychosurgery debate.* New York, NY: Freeman.

Valenstein, E. S. (1998). *Blaming the brain: The truth about drugs and mental health.* New York, NY: The Free Press.

Vallee, B. L. (1998, June). Alcohol in the Western world. *Scientific American, 278*(6), 80–85.

van Dam, L. (1996, October 1). Mindful healing: An interview with Herbert Benson. *Technology Review, 99*(7), 31–38. [See also: Bjork, 1991; Shapiro, 1985]

Van de Castle, R. L. (1983). Animal figures in fantasy and dreams. In A. Katcher & A. Beck (Eds.), *New perspectives on our lives with companion animals.* Philadelphia, PA: University of Pennsylvania Press.

Van de Castle, R. L. (1994). *Our dreaming mind.* New York, NY: Ballantine Books.

VandenBos, G. R. (1986). Psychotherapy research: A special issue. *American Psychologist, 41,* 111–112.

van den Hurk, P. A. M, Giommi, F., Gielen, S. C., Speckens, A. E. M., & Barendregt, H. P. (2010). Greater efficiency in attentional processing related to mindfulness meditation. *Quarterly Journal of Experimental Psychology, 63*(6), 1168–1180.

Van Dongen, H. P. A., Maislin, G., Mullington, J. M., & Dinges, D. F. (2003). The cumulative cost of additional wakefulness: Dose-response effects on neurobehavioral functions and sleep physiology from chronic sleep restriction and total sleep deprivation. *Journal Sleep, 26,* 117–126.

van Praag, H. (2009). Exercise and the brain: Something to chew on. *Trends in Neurosciences, 32*(5), 283–290.

Verbaten, M. N. (2003). Specific memory deficits in ecstasy users? The results of a meta-analysis. *Human Psychopharmacology: Clinical and Experimental, 18,* 281–290.

Vernon, P. A., Petrides, K. V., Bratko, D., & Schermer, J. A. (2008). A behavioral genetic study of trait emotional intelligence. *Emotion 8*(5), 635–64.

Viegas, J. (2011, January 4). Border collie breaks vocabulary record. *Discovery News.* Retrieved from http://news.discovery.com/animals/border-collie-breaks-vocabulary-record.html#mkcpgn=rssnws1.

Vincent, M., & Pickering, M. R. (1988). Multiple personality disorder in childhood. *Canadian Journal of Psychiatry, 33,* 524–529.

Vingerhoets, G., Berckmoes, C., & Stroobant, N. (2003). Cerebral hemodynamics during discrimination of prosodic and semantic emotion in speech studied by transcranial doppler ultrasonography. *Neuropsychology, 17,* 93–99.

Vogel, G. (1997, February 28). Scientists probe feelings behind decision-making. *Science, 275,* 1269.

Vogel, G. (2003, August 8). Depression drugs' powers may rest on new neurons. *Science, 301,* 757.

Vokey, J. R. (2002). Subliminal messages. In John R. Vokey and Scott W. Allen (Eds.), *Psychological Sketches* (6th ed., pp. 223–246). Lethbridge, Alberta: Psyence Ink. Retrieved from http://people.uleth.ca/~vokey/pdf/Submess.pdf.

Volkow, N. D., Wang, G.-J., Fowler, J. S., Tomasi, D., Telang, F., & Baler, R. (2010). Addiction: Decreased reward sensitivity and increased expectation sensitivity conspire to overwhelm the brain's control circuit. *BioEssays: News and Reviews in Molecular, Cellular and Developmental Biology*, *32*(9), 748–755. doi:10.1002/bies.201000042

Volpe, K. (2004). Taylor takes on "fight-or-flight." *Psychological Science, 17,* 391.

Von Fritsch, K. (1974). Decoding the language of the bee. *Science, 185,* 663–668.

Voosen, P. (2013, September 13). Inside a revolution in mental health. *The Chronicle Review,* B6–B9. Retrieved from http://chronicle.com/article/Inside-a-Revolution-in-Mental/141379/

Vuilleumier, P., & Huang, Y. (2009). Emotional attention: Uncovering the mechanisms of affective biases in perception. *Current Directions in Psychological Science, 18,* 148–152.

Vygotsky, L. S. (1934, 1987). Thinking and speech. In R. W. Rieber & A. S. Carton (Eds.) and N. Minick (Trans.), *The collected works of L. S. Vygotsky: Vol. 1. Problems of general psychology* (pp. 37–285). New York, NY: Plenum.

Wade, K. A., Garry, M., Read, J. D., & Lindsay, D. S. (2002). A picture is worth a thousand lies: Using false photographs to create false childhood memories. *Psychonomic Bulletin & Review, 9,* 597–603.

Wade, T. J. (1991). Race and sex differences in adolescent self-perceptions of physical attractiveness and level of self-esteem during early and late adolescence. *Journal of Personality and Individual Differences, 12,* 1319–1324.

Wagar, B. M., & Thagard, P. (2006). Spiking Phineas Gage: A neurocomputational theory of cognitive-affective integration in decision making. *Psychological Review, 111,* 67–79.

Wager, T. D. (2005). The neural bases of placebo effects in pain. *Current Directions in Psychological Science, 14,* 175–179.

Wager, T. D., Rilling, J. K., Smith, E. E., Sokolik, A., Casey, K. L., Davidson, R. J., . . . Cohen, J. D. (2004, February 20). Placebo-induced changes in fMRI in the anticipation and experience of pain. *Science, 303,* 1162–1167.

Wagner, U., Gais, S., Haider, H., Verleger, R., & Born, J. (2004, January 22). Sleep in spires insight. *Nature, 427,* 352–355.

Wakefield, A. J., Murch, S. H., Anthony, A., Linnell, J., Casson, D. M., Malik, M., . . . Walker-Smith, J. A. (1998). RETRACTED: Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children. *The Lancet , 351*(9103), 637–641.

Walden, J., Normann, C., Langosch, J., Berger, M., & Grunze, H. (1998). Differential treatment of bipolar disorder with old and new antiepileptic drugs. *Neuropsychobiology, 38,* 181–184.

Walker, E., Shapiro, D., Esterberg, M., & Trotman, H. (2010). Neurodevelopment and schizophrenia: Broadening the perspective, *Current Directions in Psychological Science, 19,* 204–208.

Walker, E., & Tessner, K. (2008). Schizophrenia. *Perspectives on Psychological Science, 3,* 30–37.

Walker, L. J. (1989). A longitudinal study of moral reasoning. *Child Development, 60,* 157–166.

Walker, L. J. (1991). Sex differences in moral reasoning. In W. M. Kurtines & J. L. Gewirtz (Eds.), *Handbook of moral behavior and development: Research* (Vol. 2, pp. 333–364). Hillsdale, NJ: Erlbaum.

Walker, L. J., & de Vries, B. (1985). *Moral stages/moral orientations: Do the sexes really differ?* Paper presented at the annual meeting of the American Psychological Association, Los Angeles.

Wallace, A. F. C. (1959). Cultural determinants of response to hallucinatory experience. *Archives of General Psychiatry, 1,* 58–69.

Wallace, B., & Fisher, L. E. (1999). *Consciousness and behavior.* Boston, MA: Allyn & Bacon.

Wallbott, H. G., Ricci-Bitti, P., & Banniger-Huber, E. (1986). Non-verbal reactions to emotional experiences. In K. R. Scherer, H. G. Wallbott, & A. B. Summerfield (Eds.), *Experiencing emotion: A cross-cultural study* (pp. 98–116). *European monographs in social psychology.* New York, NY: Cambridge University Press.

Walsh, R. (1984). Asian psychologies. In R. Corsini (Ed.), *Encyclopedia of Psychology,* (pp. 90–94). New York, NY: Wiley.

Walton, G. M., & Cohen, G. L. (2003). Stereotype lift. *Journal of Experimental Social Psychology, 39,* 456–467.

Wampold, B. E. (2007). The humanistic (and effective) treatment. *American Psychologist, 62,* 857–873. [See also: Barker et al., 1988.]

Wampold, B. E., & Brown, G. S. (2005). Estimating variability in outcomes attributable to therapists: A naturalistic study of outcomes in managed care. *Journal of Consulting and Clinical Psychology, 73,* 914–923. [See also: Blatt et al., 1996; Krupnick et al., 1996.]

Wampold, B. E., Goodheart, C. D., & Levant, R. F. (2007). Clarification and elaboration on evidence-based practice in psychology. *American Psychologist, 62,* 616–618.

Wang, R. L., Conner, J. M., Rickers, J., & Tuszynski, M. H. (2011). Structural plasticity within highly specific neuronal populations identifies a unique parcellation of motor learning in the adult brain. *Proceedings of the National Academy of Sciences of the United States of America*, *108*(6), 2545–2550. doi: 10.1073/pnas.1014335108

Wang, Y., Beydoun, M. A., Liang, L., Caballero, B., & Kumanyika, S. K. (2012). Will all Americans become overweight or obese? Estimating the progression and cost of the US obesity epidemic. *Obesity, 16,* 2323–2330.

Wardle, J., Steptoe, A., Bellisle, F., Davou, B., Reschke, K., & Lappalainen, M. (1997). Healthy dietary practices among European students. *Health Psychology, 16,* 443–450.

Wargo, E. (2009). Resisting temptation: Psychological research brings new strength to understanding willpower. *Observer, 22*(1), 10–17.

Warren, J. (2007). *The head trip.* New York, NY: Random House.

Watkins, L. R., & Maier, S. F. (2003). When good pain turns bad. *Current Directions in Psychological Science, 12,* 232–236.

Watson, J. B., & Rayner, R. (2000). Conditioned emotional reactions. *American Psychologist, 55,* 313–317. (Original work published by J. B. Watson and R. Rayner, 1920, *Journal of Experimental Psychology, 3,* 1–14.)

Watson, J. D. (1968). *The double helix.* New York, NY: The New American Library (Signet).

Watson, K. K., Matthews, B. J., & Allman, J. M. (2007, February). Brain activation during sight gags and language-dependent humor. *Cerebral Cortex, 17,* 314–324. [See also: Johnson, 2002; Mobbs et al., 2006; Moran et al., 2004.]

Watters, E. (2010, January 8). The Americanization of mental illness. *The New York Times.* Retrieved from www.nytimes. com/2010/01/10/magazine/10psyche-t.html.

Weaver, I. C. G., Cervoni, N., Champagne, F. A., D'Alession, A. C., Sharma, S., Seckl, J. R., . . . Meaney, M. J. (2004). Epigenetic programming by maternal behavior. *Nature Neuroscience, 7,* 847–854. Corrected online: July 27, 2004. doi:10.1038/nn1276

Wegner, D. M., Wenzlaff, R. M., & Kozak, M. (2004). Dream rebound: The return of suppressed thoughts in dreams. *Psychological Science, 15,* 232–236.

Weil, A. T. (1977). The marriage of the sun and the moon. In N. E. Zinberg (Ed.), *Alternate states of consciousness* (pp. 37–52). New York, NY: Free Press.

Weinberger, M., Hiner, S. L, & Tierney, W. M. (1987). In support of hassles as a measure of stress in predicting health outcomes. *Journal of Behavioral Medicine, 10,* 19–31.

Weir, K. (2011, December). The exercise effect. *Monitor on Psychology, 42*(11), 48–52.

Weir, K. (2012, June). The roots of mental illness: How much of mental illness can the biology of the brain explain? *Monitor on Psychology, 43*(6), 30. Retrieved from www.apa.org/ monitor/2012/06/roots.aspx

Weir, K. (2013, February). Can magnets cure depression? *Monitor on Psychology, 26*(2), 50.

Weisberg, R. (1986). *Creativity: Genius and other myths*. New York, NY: WH Freeman/Times Books/Henry Holt & Co.

Weiner, I. B., Freedheim, D. K., & Goldstein, A. M. (2003). *Handbook of psychology: Forensic psychology.* Hoboken, NJ: Wiley and Sons.

Weiner, J. (1994). *The beak of the finch.* New York, NY: Vintage Books.

Weiss, R. (2007, November 11). Study debunks theory on teen sex, delinquency. *Washington Post.* Retrieved from www.washingtonpost.com/wp-dyn/content/article/2007/11/10/AR2007111001271_pf.html.

Weissman, M. M., Bland, R. C., Canino, G. J., Faravelli, C., Greenwald, S., Hwu, H. G., Joyce, P. R., Karam, E. G., Lee, C. K., Lellouch, J., Lepine, J. P., Newman, S. C., Rubio-Stipec, M., Wells, J. E., Wickramaratne, P. J., Wittchen, H., & Yeh, E. K. (1996, July 24–31). Cross-national epidemiology of major depression and bipolar disorder. Journal of the *American Medical Association, 276,* 293–299.

Weissman, M. M., Neria, Y., Das, A., Feder, A., Blanco, C., Lantigua, R., et al. (2005). Gender differences in posttraumatic stress disorder among primary care patients after the World Trade Center attack of September 11, 2001. *Gender Medicine, 2,* 76–87.

Weisz, J, R., Rothbaum, F. M., & Blackburn, T. C. (1984). Standing out and standing in: The psychology of control in America and Japan. *American Psychologist, 39,* 955–969.

Wellman, H. M., & Estes, D. (1986). Early understanding of mental entities: A reexamination of childhood realism. *Child Development, 57,* 910–923.

Wells, B. E., & Twenge, J. M. (2005). Changes in young people's sexual behavior and attitudes, 1943–1999: A cross-temporal meta-analysis. *Review of General Psychology, 9,* 249–261.

Wentzensen, I. M., Mirabello, L., Pfeiffer, R. M., & Savage, S. A. (2011). The association of telomere length and cancer: A meta-analysis. *Cancer Epidemiology, Biomarkers, & Prevention, 20*(6), 1238–1250.

Werblin, F., & Roska, B. (2007, April). Movies in our eyes. *Scientific American, 296*(4), 73–79.

Wertheimer, M. (1923). *Untersuchungen zur Lehre von der Gestalt, II. Psychologische Forschung, 4,* 301–350.

Wesson, D. R., Smith, D. E., & Seymour, R. B. (1992). Sedative-hypnotics and tricyclics. In J. H. Lowinson, P. Ruiz, R. B. Millman, & J. G. Langrod (Eds.), *Substance abuse: A comprehensive textbook* (2nd ed., pp. 271–279). Baltimore: Williams & Wilkins.

West, C. (2009, October). "An unconscionable embarrassment." *Observer, 22*(8), 9, 11.

Westen, D. (1998). The scientific legacy of Sigmund Freud: Toward a psychodynamically informed psychological science. *Psychological Bulletin, 124,* 333–371.

Westen, D., Blagov, P. S., Harenski, K. Kilts, C., & Hamann, S. (2006). Neural bases of motivated reasoning: An fMRI study of emotional constraints on partisan political judgment in the 2004 U.S. presidential election. *Journal of Cognitive Neuroscience, 18,* 1947–1958.

Westen, D., & Bradley, R. (2005). Empirically supported complexity: Rethinking evidence-based practice in psychotherapy. *Current Directions in Psychological Science, 14,* 266–271.

Westen, D., Novotny, C. M., & Thompson-Brenner, H. (2005). EBP ≠ EST: Reply to Crits-Christoph et al. (2005) and Weisz et al. (2005). *Psychological Bulletin, 131,* 427–433.

Whalen, P. J. (1998) Fear, vigilance, and ambiguity: Initial neuroimaging studies of the human amygdala. *Current Directions in Psychological Science, 7,* 177–188.

Wheaton, A. G., Perry, G. S., Chapman, D. P., & Croft, J. B. (2012). Sleep disordered breathing and depression among U.S. adults: National Health and Nutrition Examination Survey, 2005-2008. *Sleep, 35*(4), 461–467. http://dx.doi. org/10.5665/sleep.1724

Wheeler, J. G., Christensen, A., & Jacobson, N. S. (2001). Couple distress. In Barlow, D. H. (Ed). *Clinical handbook of psychological disorders: A step-by-step treatment manual* (3rd ed., pp. 609–630). New York, NY: Guilford.

Whitley, B. E., Jr. (1999). Right-wing authoritarianism, social dominance orientation, and prejudice. *Journal of Personality and Social Psychology, 7,* 126–134.

Whyte, W. F. (1972, April). Skinnerian theory in organizations. *Psychology Today,* 67–68, 96, 98, 100.

Wicherski, M., Michalski, D., & Kohout, J. (2009). *2007 Doctorate employment survey.* APA Center for Workforce Studies.

Retrieved from www.apa.org/workforce/publications/07-doc-empl/index.aspx.

Wickelgren, I. (1997, June 27). Marijuana: Harder than thought? *Science, 276,* 1967–1968.

Wickelgren, I. (1998a, August 28). A new route to treating schizophrenia? *Science, 281,* 1264–1265.

Wickelgren, I. (1998b, May 29). Obesity: How big a problem? *Science, 280,* 1364–1367.

Wickelgren, I. (1998c, June 26). Teaching the brain to take drugs. *Science, 280,* 2045–2047.

Wickelgren, I. (1999, March 19). Nurture helps mold able minds. *Science, 283,* 1832–1834.

Wickelgren, I. (2001, March 2). Working memory helps the mind focus. *Science, 291,* 1684–1685.

Wickelgren, I. (2006, May 26). A vision for the blind. *Science, 312,* 1124–1126. [See also Leutwyler, 1994; Service, 1999]

Wickelgren, W. (1974). *How to solve problems: Elements of a theory of problems and problem solving.* San Francisco, CA: W. H. Freeman.

Wiggins, J. S. (1973). *Personality and prediction: Principles of personality assessment.* Reading, MA: Addison-Wesley.

Wilensky, A. E., Schafe, G. E., Kristensen, M. P., & LeDoux, J. E. (2006). Rethinking the fear circuit: The central nucleus of the amygdala is required for the acquisition, consolidation, and expression of Pavlovian fear conditioning. *Journal of Neuroscience, 26,* 12,387–12,396. [See also: Paré et al., 2004]

Willcutt, E. G. (2012). The prevalence of DSM-IV attention-deficit/hyperactivity disorder: a meta-analytic review. *Neurotherapeutics, 9,* 490–499.

Willford, J. A. (2006). Moderate prenatal alcohol exposure and cognitive status of children at Age 10. *Alcoholism: Clinical and Experimental Research 30,* 1051–1059.

Wills, T. A. (1991). Similarity and self-esteem in downward comparisons. In J. Suls & T. A. Wills (Eds)., *Social Comparison: Contemporary Theory and Research* (pp. 51–78). Hillsdale, NJ: Erlbaum.

Wills, T. A., & DePaulo, B. M. (1991). Interpersonal analysis of the help-seeking process. In C. R. Snyder & D. R. Forsyth (Eds*.), Handbook of social and clinical psychology: The health perspective* (pp. 350–375). New York, NY: Pergamon Press.

Wilner, D., Walkley, R., & Cook, S. (1955). *Human relations in interracial housing.* Minneapolis: University of Minnesota Press.

Wilson, D. A., & Stevenson, R. J. (2006). *Learning to smell: Olfactory perception from neurobiology to behavior.* Baltimore: Johns Hopkins.

Wilson, E. O. (1998). *Consilience: The Unity of Knowledge*. New York, NY: Alfred A. Knopf.

Wilson, E. O. (2004). *On Human Nature (25th Anniversary Edition*). Cambridge, MA: Harvard University Press.

Wilson, G. (2014). *Your brain on porn: Internet pornography and the emerging science of addiction.* Commonwealth Publishing.

Wilson, R. I., & Nicoll, R. A. (2002, April 26). Endocannabinoid signaling in the brain. *Science, 296,* 678–682.

Wilson, S. M., & Medora, N. P. (1990). Gender comparisons of college students' attitudes toward sexual behavior. *Adolescence, 25,* 615–627.

Wilson, T. D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious.* Cambridge, MA: Belknap Press/Harvard University Press.

Wimber, M., Alink, A., Charest, I., Kriegeskorte, N., & Anderson, M. C. (2015). Retrieval induces adaptive forgetting of competing memories via cortical pattern suppression. *Nature Neuroscience, 18,* 582–589. doi: 10.1038/nn.3973

Windholz, G. (1997). Ivan P. Pavlov: An overview of his life and psychological work. *American Psychologist, 52,* 941–946.

Winerman, L. (2005a, September). The culture of memory. *Monitor on Psychology, 36*(8), 56–57.

Winerman, L. (2005b, July/August). Fighting pho-bias: Figuring out phobia. *Monitor on Psychology; 36*(7), 96–98.

Winerman, L. (2005c, June). Intelligence, sugar and the car-lot hustle headline WPA meeting. *Monitor on Psychology, 36*(3), 38–39.

Winerman, L. (2005d, July/August). A virtual cure. *Monitor on Psychology, 36*(7), 87–89. [See also: Hoffman, 2004; Rothbaum & Hodges, 1999; Rothbaum et al., 2000]

Winerman, L. (2006a, January). Brain, heal thyself. *Monitor on Psychology, 37*(1), 56–57.

Winerman, L. (2006b, April). Bringing recovery home: Telehealth initiatives offer support and rehabilitation services in remote locations. *Monitor on Psychology, 37*(4), 32–34.

Winerman, L. (2006c, April). Bringing recovery home: Telehealth initiatives offer support and rehabilitation services in remote locations. *Monitor on Psychology, 37*(4), 32–34.

Winerman, L. (2006d, February). The culture-cognition connection. *Monitor on Psychology, 37*(2), 64–65.

Winerman, L. (2012a, September). Changing our brains, changing ourselves. *Monitor on Psychology, 43*(8), 30–33.

Winerman, L. (2012b, February). Questionnaire: "A machine for jumping to conclusions." *Monitor on Psychology, 43*(2), 24–27.

Winkielman, P., Knutson, B., Paulus, M., & Trujillo, J. L. (2007). Affective influence on judgments and decisions: Moving toward core mechanisms. *Review of General Psychology, 11,* 179–192.

Winn, P. (ed.). (2001). *Dictionary of biological psychology*. New York, NY: Routledge.

Winner, E. (2000). The origins and ends of giftedness. *American Psychologist, 55,* 159–169.

Winter, D. G., John, O. P., Stewart, A. J., & Klohnen, E. C. (1998). Traits and motives: Toward an integration of two traditions in personality research. *Psychological Review, 105,* 230–250.

Winters, J. (2002, January). Hey birder, this phone's for you. *Discover,* 75.

Wirth, S., Yanike, M., Frank, L. M., Smith, A. C., Brown, E. N., & Suzuki, W. A. (2003, June 6). Single neurons in the monkey hippocampus and learning of new associations. *Science, 300,* 1578–1581.

Wise, R. A. (2004). Dopamine, learning and motivation. *Nature Reviews Neuroscience, 5*(6), 483–494.

Wise, R. A. (2008). Dopamine and reward: The anhedonia hypothesis 30 years on. *Neurotoxicity Research, 14*(2–3), 169–183.

Wixted, J. T. (2005). A theory about why we forget what we once knew. *Current Directions in Psychological Science, 14* 6–9. [See also: McClelland et al., 1995]

Wolf, A. M., & Colditz, G. A. (1998). Current estimates of the economic cost of obesity in the United States. *Obesity Research, 6,* 97–106.

Wolfson, A. (2005, October 19). A hoax most cruel. *The Courier-Journal* (Louisville, Kentucky).

Wolpe, J. (1958). *Psychotherapy by reciprocal inhibition.* Stanford, CA: Stanford University Press.

Wolpe, J. (1973). *The practice of behavior therapy* (2nd ed.). New York, NY: Pergamon.

Wolpe, J., & Plaud, J. J. (1997). Pavlov's contributions to behavior therapy: The obvious and the not so obvious. *American Psychologist, 52,* 966–972.

Wolraich, M. L., Wilson, D. B., & White, J. W. (1995). The effect of sugar on behavior or cognition in children: a meta-analysis. *JAMA*, 274(20), 1617–1621.

Wong, M. M., & Csikszentmihalyi, M. (1991). Motivation and academic achievement: The effects of personality traits and the quality of experience. *Journal of Personality, 59,* 539–574.

Wood, J. M., Bootzin, R. R., Rosenhan, D., & Nolen-Hoeksema, S. (1992). Effects of the 1989 San Francisco earthquake on frequency and content of nightmares. *Journal of Abnormal Psychology, 101,* 219–224.

Woodworth, R. S. (1918). *Dynamic psychology.* New York, NY: Columbia University Press.

World Health Organization. (1973). *Report of the International Pilot Study of Schizophrenia (Vol. 1).* Geneva, Switzerland: Author.

World Health Organization. (1979). *Schizophrenia: An international follow-up study.* New York, NY: Wiley.

Wright, E. R., Gronfein, W. P., & Owens, T. J. (2000). Deinstitutionalization, social rejection, and self-esteem of former mental patients. *Journal of Health and Social Behavior, 41,* 68–90.

Wurtman, R. J. (1982, April). Nutrients that modify brain functions. *Scientific American, 242,* 50–59.

Wynn, K. (1992). Addition and subtraction by human infants. *Nature, 358,* 749–759.

Wynn, K. (1995). Infants possess a system of numerical knowledge. *Current Directions in Psychological Science, 4,* 172–177.

Yacoubian, G. S. Jr., Deutsch, J. K., & Schumacher, E. J. (2004). Estimating the prevalence of ecstasy use among club rave attendees. *Contemporary Drug Problems, 31,* 163–177.

Yale Center for Dyslexia and Creativity. (2015). *An index of successful dyslexics.* Retrieved from http://dyslexia.yale.edu/successfuldyslexics.html

Yalom, I. D., & Greaves, C. (1977). Group therapy with the terminally ill. *American Journal of Psychiatry, 134,* 396–400.

Yamamoto, A. (Producer). (2000, October 8). *NHK Special* [Television broadcast of Olympic Games]. Tokyo: NHK. [As cited in Markus et al., 2006.]

Yeaman, J. (1995). Who is resilient? Who is vulnerable? *Dissertation Abstracts International, Section A: Humanities and Social Sciences, 55,* 3110.

Yee, A. H. (1995). Evolution of the nature–nurture controversy: Response to J. Philippe Rushton. *Educational Psychology Review, 7,* 381–390.

Yee, P. L., Pierce, G. R., Ptacek, J. R., & Modzelesky, K. L. (2003). Learned helplessness, attributional style, and examination performance: Enhancement effects are not necessarily moderated by prior failure. *Anxiety, Stress & Coping, 16,* 359–373.

Yerkes, R. M. (1921). Psychological examining in the United States Army. In R. M. Yerkes (Ed.), *Memoirs of the National Academy of Sciences: Vol. 15.* Washington, DC: U.S. Government Printing Office.

Yong, E. (2014, February 2). Pruning synapses improves brain connections. *The Scientist.* Retrieved from http://www.the-scientist.com/?articles.view/articleNo/39055/title/Pruning-Synapses-Improves-Brain-Connections/

Young, J. R. (2003, February 14). Prozac campus. *The Chronicle of Higher Education,* A-37–A-38.

Yu, E. (2014) At "Wit's End": Scared Straight programs remain popular among parents despite warnings. *Juvenile Justice Information Exchange*, May 9, 2014. Retrieved from http://jjie.org/at-wits-end-scared-straight-programs-remain-popular-among-parents-despite-warnings/

Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology. Monograph Supplement, 9*(2, Part 2), 1–27.

Zajonc, R. B. (2001). *Mere exposure effects explained . . . finally!* Address given to the Western Psychological Association annual convention in Lahaina (Maui), Hawaii.

Zakowski, S. G., Hall, M. H., Klein, L. C., & Baum, A. (2001). Appraised control, coping, and stress in a community sample: A test of the goodness-of-fit hypothesis. *Annals of Behavioral Medicine, 23,* 158–165.

Zaman, R. M. (1992). Psychotherapy in the third world: Some impressions from Pakistan. In U. P. Gielen, L. L. Adler, & N. A. Milgram (Eds.), *Psychology in international perspective* (pp. 314–321). Amsterdam: Swets & Zeitlinger.

Zaragoza, M. S., Mitchell, K. J., Payment, K., & Drivdahl, S. (2011). False memories for suggestions: The impact of conceptual elaboration. *Journal of Memory and Language, 64,* 18–31.

Zarit, S. H., & Pearlin, L. I. (Eds.). (2003). *Personal control in social and life course contexts: Societal impact on aging* (pp. 127–164). New York, NY: Springer Publishing.

Zhan, Y., Paolicelli, R. C., Sforazzini, F., Weinhard, L., Bolasco, G., Pagani, F., . . . Gross, C. T. (2014). Deficient neuron-microglia signaling results in impaired functional brain connectivity and social behavior. *Nature Neuroscience, 17,* 400–406.

Zhang, J. W., & Howell. (2014, September). Paper presented at the 1st International Conference on Time Perspective, Coimbre, Portugal. V. Ortuno & P.Cordeiro (Eds.). Coimbre University Press.

Zhao, J., Miao, K., Wang, H., Ding, H., & Wang, D. W. (2013). Association between telomere length and type 2 diabetes mellitus: a meta-analysis. (2013). *PLoS One, 8*(11).

Zhou, W., & Chen, D. (2009, February). Fear-related chemosignals modulate recognition of fear in ambiguous facial expressions. *Psychological Science, 20,* 177–183. doi:10.1111/j.1467-9280.2009.02263.x

Zigler, E., & Muenchow, S. (1992). *Head Start: The inside story of America's most successful educational experiment.* New York: Basic Books.

Zigler, E., & Styfco, S. J. (1994). Head Start: Criticisms in a constructive context. *American Psychologist, 49,* 127–132.

Zilbergeld, B. (1986, June). Psychabuse. *Science, 86,* 7, 48.

Zimbardo, P. G. (1953). The dynamics of prejudice and assimilation among two underprivileged minority groups in New York City. *Alpha Kappa Delta, XXIV (1),* 16–22.

Zimbardo, P. G. (1977). *Shyness: What it is, what to do about it.* Reading, MA: Addison Wesley. (Reprinted in 1991.)

Zimbardo, P. G. (1990). *Shyness: What it is, what to do about it* (Rev. ed.). Reading, MA: Perseus Books. (Original work published 1977.)

Zimbardo, P. G. (1999). Discontinuity theory: Cognitive and social searches for rationality and normality—may lead to madness. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 31, pp. 345–486). San Diego, CA: Academic Press.

Zimbardo, P. G. (2004a, July). *The politics of fear.* Address given at the annual convention of the American Psychological Association, Honolulu, HI.

Zimbardo, P. G. (2004b, May 9). Power turns good soldiers into "bad apples." *Boston Globe,* D11.

Zimbardo, P. G. (2007). *The Lucifer effect: Understanding how good people turn evil.* New York, NY: Random House. [See also: Haney et al., 1973; Haney & Zimbardo, 1998; Zimbardo, 1973, 1975; Zimbardo et al., 1999; replicated in Australia by Lovibond et al., 1979]

Zimbardo, P. G. (2008). On being "Shoe" at Yale: A study in institutional conformity. In preparation. Stanford University.

Zimbardo, P. G. (2011). *The demise of guys?* TED talk. Retrieved from http://www.ted.com/talks/zimchallenge?language=en

Zimbardo, P. G., Andersen, S. M., & Kabat, L. (1981). Induced hearing deficit generates experimental paranoia. *Science, 212,* 1529–1531.

Zimbardo, P. G., Maslach, C., & Haney, C. (1999). Reflections on the Stanford prison Experiment: Genesis, transformations, consequences. In T. Blass (Ed.), *Obedience to authority: Current perspectives on the Milgram paradigm* (pp. 193–237). Mahwah, NJ: Erlbaum.

Zimbardo, P. G., & Boyd, J. N. (1999). Putting time in perspective: A valid, reliable individual-differences metric. *Journal of Personality and Social Psychology, 77,* 1271–1288.

Zimbardo, P. G., & Coulombe, N. D. (2015). *Man (dis)connected: How technology has sabotaged what it means to be male.* London, England: Rider.

Zimbardo, P. G., & Duncan, N. (2012). *The demise of guys: why boys are struggling and what we can do about it* [Kindle version].

Zimbardo, P. G., & Gerrig, R. J. (1999). *Psychology and life*, 15th ed. Boston, MA: Allyn & Bacon.

Zimbardo, P. G., & Leippe, M. (1991). *The psychology of attitude change and social influence.* New York, NY: McGraw-Hill.

Zimbardo, P. G., & Montgomery, K. D. (1957). The relative strengths of consummatory responses in hunger, thirst, and exploratory drive. *Journal of Comparative and Physiological Psychology, 50,* 504–508.

Zimbardo, P.G., Sword, R., & Sword, R. (2012). *The time cure: Overcoming PTSD with the new psychology of time perspective therapy*. San Francisco, CA: Jossey-Bass.

Zimmer, C. (2010, May). The brain: The first yardstick for measuring smells. *Discover, 31*(4), 28–29.

Zimmerman, F. J., & Christakis, D. A. (2007). Associations between content types of early media exposure and subsequent attentional problems. *Pediatrics, 120,* 986–992.

Zimmerman, F. J., Christakis, D. A., & Meltzoff, A. N. (2007). Television and DVD/video viewing in children younger than 2 years. *Archives of Pediatrics and Adolescent Medicine*, *16,* 473–479.

Zimmerman, S. (2002). *Writing to heal the soul: Transforming grief and loss through writing.* New York, NY: Three Rivers Press/Crown Publishing.

Zucker, G. S., & Weiner, B. (1993). Conservatism and perceptions of poverty: An attributional analysis. *Journal of Applied Social Psychology, 23,* 925–943.

Zuckerman, M. (1974). The sensation-seeking motive. In B. Maher (Ed.), *Progress in experimental personality research* (Vol. 7). New York, NY: Academic Press.

Zuckerman, M. (1990). Some dubious premises in research and theory on racial differences: Scientific, social, and ethical issues. *American Psychologist, 45,* 1297–1303.

Zuckerman, M. (1995). Good and bad humors: Biochemical bases of personality and its disorders. *Psychological Science, 6,* 325–332.

Zuckerman, M. (2004). The shaping of personality: Genes, environments, and chance encounters. *Journal of Personality Assessment, 82,* 11–22. [See also: Zuckerman, 1995; Zuckerman et al., 1978, 1980, 1993.]

Zuckerman, M., Eysenck, S., & Eysenck, H. J. (1978). Sensation seeking in England and America: Crosscultural, age and sex comparisons. *Journal of Consulting and Clinical Psychology, 46,* 139–149.

Zuckerman, M., Buchsbaum, M. S., & Murphy, D. L. (1980). Sensation seeking and its biological correlates. *Psychological Bulletin, 88,* 187–214.

Zuckerman, M., Kuhlman, D. M., Joireman, J., Teta, P., & Kraft, M. (1993). A comparison of three structural models for personality: The Big Three, the Big Five, and the Alternative Five. *Journal of Personality and Social Psychology, 65,* 575–768.

# Credits

## Photo Credits

**Photographs**  Cover Image Maria Galybina/Shutterstock

**Chapter 1**  Chapter Opener p. 1 Corbis Premium RF/Alamy; p. 5 (left) 20th Century Fox/Album/Superstock; p. 5 (right) Rose Palmisano/Zuma Press/Santa Ana/Arkansas/U.S./Newscom; p. 9 YAKOBCHUK VASYL/Shutterstock; p. 12 Vectorbox/Fotolia; p. 14 Takke mei/Fotolia; p. 14 Mr.Markin/Fotolia; p. 14 Philip G. Zimbardo; p. 15 Naf/Cartoonstock; p. 17 Richard Lord/The Image Works; p. 24 Sergey Uryadnikov/Shutterstock; p. 25 Robert V. Guthrie.

**Chapter 2**  Chapter Opener p. 33 Science Photo Library/Corbis; p. 36 Van der Meer Marica/Arterra Picture Library/Alamy; p. 36 Zarg404/Fotolia; p. 37 Dlillc/Latitude/Corbis; p. 37 Daniel Arsenault/The Image Bank/Corbis; p. 53 Philip G. Zimbardo, Inc.; p. 54 SPL/Science Source; p. 55 Image Source/IS406/Alamy; p. 55 Visuals Unlimited/Encyclopedia/Corbis; p. 55 MachineHeadz/Getty Images; p. 55 Stegerphoto/Photolibrary/Getty Images; p. 58 Barry Lewis/In Pictures//Terra/Corbis; p. 58 Kayte Deioma/PhotoEdit; p. 58 Dennis Galante/Flirt/Corbis; p. 60 Geoff Tompkinson/Science Source; p. 69 Robert L. Johnson; p. 70 John Cordes/Icon Smi 506/John Cordes/Icon Smi/Newscom; p. 71 MirMar/Fotolia.

**Chapter 3**  Chapter Opener p. 74 Gianni Dagli Orti/The Art Archive/Art Resource, NY; p. 76 Tony Brindley/Shutterstock; p. 80 Adam Ziaja/Shutterstock; p. 86 Fritz Goro/Time & Life Pictures/Getty Images; p. 86 Vadim Kozlovsky/Shutterstock; p. 92 Flairimages/Fotolia; p. 101 Gianni Dagli Orti/The Art Archive/Art Resource, NY; p. 105 yuliabikirova/Fotolia; p. 108 Paul Fenton/Zumapress.com/Newscom; p. 110 Mark Richards/PhotoEdit; p. 111 Trekandphoto/Fotolia; p. 111 Andrew Drysdale/Rex/Newscom; p. 113 Gennadiy Poznyakov/Alamy.

**Chapter 4**  Chapter Opener p. 117 Bilderbox/Insadco Photography/Alamy; p. 119 Shuva Rahim/Fotolia; p. 123 Moccabunny/Fotolia; p. 125 Photographee.eu/Fotolia; p. 126 crazycolors/Fotolia; p. 127 Frank Micelotta/Invsion/AP Images; p. 130 King Features Syndicate; p. 133 Tony Freeman/PhotoEdit; p. 134 SashaFoxWalters E+/Getty Images; p. 137 Spencer Weiner/Getty Images; p. 142 SuperStock/SuperStock; p. 144 Randimal/Fotolia; p. 144 Alexandre Zveiger/Fotolia; p. 146 Akg-Images/Jürgen Sorges/Newscom; p. 148 Rainer Plendl/Fotolia; p. 149 JupiterImages/Getty Images.

**Chapter 5**  Chapter Opener p. 153 Anyaberkut/Fotolia; p. 159 Nick Daly/Photodisc/Getty Images; p. 165 Budimir Jevtic/Fotolia; p. 166 Levent Konuk/Shutterstock; p. 168 Tommaso Lizzul/Fotolia; p. 169 Shawn Thew/Epa/Newscom; p. 173 Orhan Cam/Shutterstock.

**Chapter 6**  Chapter Opener p. 188 R. Magunia/Joker/SZ Photo/The Image Works; p. 191 FloridaStock/Shutterstock; p. 191 Janelle Lugge/Shutterstock; p. 194 Lucy Brown, Ph.D.; p. 196 Joshua Correll; p. 203 Sergey Ryzhov/Fotolia; p. 204 Bettmann/Corbis; p. 213 Denys_Kuvaiev/Fotolia; p. 218 fffffffy/Shutterstock; p. 223 Emese/Shutterstock; p. 223 Jeremy Sutton-Hibbert/Alamy.

**Chapter 7**  Chapter Opener p. 231 Stockbyte/Getty Images; p. 234 Dr G. Moscoso/Science Source; p. 240 Nina Leen/Time & Life Pictures/Getty Images; p. 244 BillionPhotos.com/Fotolia; p. 248 Giuseppe_R/Shutterstock; p. 256 Corepics/Fotolia; p. 257 Peter Dazeley/Photographer's Choice/Getty Images; p. 257 Gyso4ka/Fotolia; p. 259 David Buffington/ Blend Images/Getty Images; p. 261 Ted Foxx/Alamy; p. 262 Robin Beckham/BEEPstock/Alamy; p. 262 Courtesy of Nickolay Lamm; p. 263 Joshua Resnick/Fotolia LLC; p. 267 MIXA/Alamy; p. 268 Courtesy of Bully-Busters 702; p. 271 Petrenko Andriy/Shutterstock; p. 273 Stephen Coburn/Fotolia; p. 277 Bikeriderlondon/Shutterstock;

p. 277 Westend61 - Bader-Butowski/Getty Images; p. 278 Paul Burns/DigitalVision/Getty Images; p. 279 Monkey Business/Fotolia; p. 282 JGI/Blend Images/Getty Images.

**Chapter 8**  Chapter Opener p. 287 Summit Entertainment/Album/Newscom; p. 282 JPC-Prod/Fotolia; p. 290 Marcus E. Raichle, M.D., Prof. of Radiology and Neurology; p. 291 Primoz Jenko/123RF; p. 293 Andrey N Bannov/Shutterstock; p. 294 GeniusKp/Shutterstock; p. 295 BillionPhotos.com/Fotolia; p. 298 Caiaimage/Martin Barraud/Getty Images; p. 302 WavebreakmediaMicro/Fotolia LLC; p. 303 M Timothy O'Keefe/Photographer's Choice RF/Getty Images; p. 304 Joseph Martin/Album/Newscom; p. 309 BSIP/Photoshot; p. 312 Sommai/Fotolia; p. 312 Africa Studio/Fotolia; p. 314 Gilles Mingasson/Getty Images; p. 316 Molecular Imaging Branch, National Institute of Mental Health; p. 317 Istvan Csak/Shutterstock; p. 319 Bob Ash/Shutterstock.

**Chapter 9**  Chapter Opener p. 323 John Green/Cal Sport Media/Newscom; p. 325 PhotosIndia.com LLC / Alamy; p. 326 Antonio Scorza/AFP/Newscom; p. 327 Matt Rourke/AP Images; p. 329 Halfpoint/Shutterstock; p. 344 Ericsphotography/iStock /Getty Images Plus/Getty Images; p. 345 Ostill/Shutterstock; p. 345 Eivaisla/Shutterstock; p. 345 Kantver/Fotolia; p. 345 Amazingmikael/Shutterstock; p. 345 Jason Stitt/Shutterstock; p. 345 Marco Tiberio/Fotolia.

**Chapter 10**  Chapter Opener p. 363 Danielle Bonardelle/Fotolia; p. 366 Arena Creative/Shutterstock; p. 367 Stocktrek Images, Inc./Alamy; p. 367 Library of Congress Prints and Photographs Division [LC-USZ62-12380]; p. 367 Library of Congress Prints and Photographs Division [LC-DIG-ppbd-00358]; p. 369 Susanna Bennett/Alamy; p. 369 Afp/Getty Images; p. 371 Photographee.eu/Fotolia LLC; p. 372 Deposit Photos/Glow Images; p. 373 Dmitry Rogatnev/Getty Images; p. 374 idiz/Shutterstock; p. 383 Wavebreakmedia/Shutterstock; p. 384 Anankkml/Fotolia; p. 385 Science Source; p. 387 The Advertising Archives; p. 388 GaryAlvis/E+/Getty Images; p. 392 Wong Yu Liang/123RF; p. 394 Philip Zimbardo; p. 396 Richard T. Nowitz/Getty Images.

**Chapter 11**  Chapter Opener p. 409 Collection Christophel/Alamy; p. 414 CP Cushing/ClassicStock/The Image Works; p. 414 Group/Newscom; p. 414 ClassicStock/Alamy Stock Photo; p. 414 J. NETTIS/ClassicStock/Alamy; p. 421 Henry Martin/ The New Yorker Collection/Cartoonbank; p. 422 Samopauser/Fotolia; p. 423 From the film Obedience copyright 1968 by Stanley Milgram. Copyright renewed 1993 by Alexandra Milgram, distributed by Penn State Media Sales.; p. 423 From the film Obedience copyright 1968 by Stanley Milgram. Copyright renewed 1993 by Alexandra Milgram, distributed by Penn State Media Sales; p. 423 From the film Obedience copyright 1968 by Stanley Milgram. Copyright renewed 1993 by Alexandra Milgram, distributed by Penn State Media Sales; p. 428 The New York Times Photo Archive; p. 435 Oliveromg/Shutterstock; p. 441 Michael Blann/Digital Vision/Getty images; p. 442 Andrey Arkusha/Shutterstock; p. 443 Philip G. Zimbardo; p. 443 Philip G. Zimbardo; p. 446 Kristoffer Tripplaar/Alamy; p. 447 Laurie Skrivan/Zuma Press/Newscom; p. 451 Philip G. Zimbardo; p. 453 Steve Dietl/Ifc Films/Everett Collection; p. 455 AP Images; p. 461 Philip Zimbardo.

**Chapter 12**  Chapter Opener p. 464 Andr Held/Akg-images/Newscom; p. 479 Image Source/Getty Images; p. 481 Andriy Popov/123RF; p. 486 Dr. E. Fuller Torrey and Dr. Weinberger/National Institute of Mental Health; p. 490 Leungchopan/Shutterstock.

**Chapter 13**  Chapter Opener p. 497 WavebreakmediaMicro/Fotolia; p. 505 AP Images; p. 507 Michael Rougier/Time & Life Pictures/Getty

Images; p. 509 Monkey Business Images/Shutterstock; p. 523 Stormcab/Alamy; p. 524 Simon Price/Alamy.

**Chapter 14** Chapter Opener p. 535 Af Archive/Alamy; p. 536 Steve Welsh/Alamy; p. 536 Imagebroker/Alamy; p. 540 Handout/KRT/ Newscom; p. 540 Images-USA/Alamy; p. 543 Moment/Getty Images; p. 551 Jose Manuel Ribeiro/Reuters; p. 556 Anthony Correia/ Shutterstock; p. 567 Altrendo/Getty Images; p. 569 Jack Hollingsworth/Blend Images/Corbis; p. 573 Cultura Creative(Rf)/Alamy.

## Text Credits

**Chapter 1 Figure 1-1** p. 3: 2009 Doctorate Employment Survey (APA Center for Workforce Studies, March 2011); **Excerpt** on p. 5: Supreme Court Justice Potter Stewart in 1964; **Excerpt** on p. 5: Nova Online. (1996). Kidnapped by UFOs? Retrieved August 2, 2007, from www.pbs. org/wgbh/nova/aliens/carlsagan.html; **Excerpt** on p. 11: Wilhelm Wundt, German scientist (1832–1920); **Excerpt** on p. 13: Skinner, B. F. (1989). The origins of cognitive thought. *American Psychologist*, *44*, 13–18; **Excerpt** on p. 24: Schwarz, N. (1999). Self-reports: How the questions shape the answers. *American Psychologist*, *54*, 93–105; **Figure 1–1** p. 28: Based on http://www.smartinsights.com/social-media-marketing/ social-media-platforms/history-hashtags-infographic/.

**Chapter 2 Excerpt** on p. 33: Taylor, J. B. (2009). *My stroke of insight*. New York: Penguin Books., p. xiv; **Excerpt** on p. 34: Taylor, J. B. (2009). *My stroke of insight*. New York: Penguin Books., pp. 42–43; **Excerpt** on p. 34: Taylor, J. B. (2009). *My stroke of insight*. New York: Penguin Books, pp. 44; **Excerpt** on p. 34: Taylor, J. B. (2009). *My stroke of insight*. New York: Penguin Books, pp. 185; © Pearson Education, Inc.; **Figure 2–10** p. 55: © Pearson Education, Inc.; **Figure 2–14** p. 60: http://kids.britannica. com/comptons/art-126370/A-phrenological-map-of-the-brain-shows-the-size-of; **Figure 2–17** p. 64: http://www.google.com/url?sa=i &rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0CA YQjB0&url=http%3A%2F%2Fwww.indiana.edu%2F~p1013447%2Fdic tionary%2Fassn_cor.htm&ei=yxKDVZrVAtfcoATq6YpQ&bvm=bv.960 42044,d.cGU&psig=AFQjCNFWfWphSMvl-RoLlHoZtkYkU1sJqQ& ust=1434739765971649; **Excerpt** on p. 66: Taylor, J. B. (2009). *My stroke of insight*. New York: Penguin Books, p. 70; **Excerpt** on p. 66: Taylor, J. B. (2009). *My stroke of insight*. New York: Penguin Books, p. 71; **Excerpt** on p. 70: Former teammate Natrone Means, "The violent life and sudden death of Junior Seau."

**Chapter 3 Figure 3–8** p. 84: Based on Frisby, J. P. (1980). *Seeing: Illusion, brain and mind*. New York: Oxford University Press; **Figure 3–9** p. 85: Sekuler, R., & Blake, R. (1994). *Perception*, 3rd ed. New York: McGraw-Hill. Copyright © 1994. Reprinted by permission of authors; **Figure 3–15** p. 90: Miller, D. C. (1916/1922). *The science of musical sounds*. New York: W. H. Freeman. Reprinted by permission of Case Western Reserve University; **Figure 3–16** p. 91: Retrieved from: Wikipedia; **Figure 3–17** p. 93: Based on Zimbardo, P. G., & Gerrig, R. J. (1999). *Psychology and life*, 15th ed. Boston, MA: Allyn and Bacon. © 1999 by Pearson Education. Reprinted by permission of the publisher; **Excerpt** on p. 100: Based on Fariva, R. (2009). Dorsal–ventral integration in object recognition. *Brain Research Reviews*, *61*, 144–153. Goodale, M. A., & Milner, A. D. (1992). Separate visual pathways for perception and action. *Trends in Neuroscience*, *15*, 20–25; **Excerpt** on p. 96: William Shakespeare quoted in *Romeo and Juliet*: Act 2, Scene 2 in 1597; **Excerpt** on p. 97: Based on Ramachandran & Hubbard, 2003. The phenomenology of synaesthesia. *Journal of Consciousness Studies*, *10*, No. 8, 2003, pp. 49–57; **Figure 3–21** p. 100: © Pearson Education, Inc.; Levine, M. W., & Shefner, J. (2000). *Fundamentals of sensation & perception*. New York: Oxford University Press. Reprinted by permission of Michael W. Levine; **Figure 3–24** p. 103: Levine, M. W., & Shefner, J. (2000). *Fundamentals of sensation & perception*. New York: Oxford University Press. Reprinted by permission of Michael W. Levine; Adelson, E. H. (2010). Checker-shadow illusion. Retrieved from http://persci.mit.edu/gallery/ checkershadow. © 1995, Edward H. Adelson; **Figure 3–26** p. 104: Adelson, E. H. (2010). Checkershadow illusion. Retrieved from http:// persci.mit.edu/gallery/checkershadow. © 1995, Edward H. **Figure 3–27** p. 104: Shepard and presented in his 1990 book *Mind sights* (Freeman). http://www.amazon.com/Mind-Sights-Ambiguities-Commentary-

Perception/dp/0716721333; Goldberg, C. (2008, March 3). Brain scans support surprising differences in perception between Westerners and Asians. *The Boston Globe*, p. C1; **Excerpt** on p. 109: "The Americans are more zoom and the East Asians are more panoramic" (12 words); Based on http://www.angelfire.com/ok/szalonalaska/psyc101.html; **Figure 3–36** p. 110: Based on http://www.angelfire.com/ok/ szalonalaska/psyc101.html; **Excerpt** on p. 114: Based on Druckman, D., & Bjork, R. A. (1991). *In the mind's eye: Enhancing human performance*. Washington, DC: National Academy Press.

**Chapter 4 Excerpt** on p. 117: John B Watson. (1924). *Behaviorism*, New York: W.W. Norton; **Figure 4–1** p. 121: Based on Zimbardo, P.G., & Gerrig, R. J. (1999). *Psychology and life*, 15th ed. Boston, MA: Allyn and Bacon. Copyright © 1999 by Pearson Education; **Figure 4–2** p. 122: Based on Zimbardo, P.G., & Gerrig, R. J. (1999). *Psychology and life*, 15th ed. Boston, MA: Allyn and Bacon. Copyright © 1999 by Pearson Education; **Excerpt** on p. 124: Edwards, A. E., & Acker, L. E. (1962). A demonstration of the long-term retention of a conditioned galvanic skin response. *Psychosomatic Medicine*, *24*, 459–463.

**Chapter 5 Excerpt** on p. 154: Schacter, D. L. (1996). *Searching for memory: The brain, the mind, and the past*. New York: Basic Books. p. 249; **Figure 5–1** p. 156: Nickerson, R., & Adams, M. (1979). Long-term memory for a common object. *Cognitive Psychology*, *11*(1), 287–307. Copyright © 1979. Republished with permission of Elsevier; permission conveyed through Copyright Clearance Center, Inc.; **Figure 5–7** p. 162: Based on Baddeley, A. (2000). The episodic buffer: A new component of working memory? *Trends in Cognitive Sciences*, *4*, 417–423; **Excerpt** on p. 172: McCarthy, K. (1991, August). Moods—good and bad—color all aspects of life. *APA Monitor*, *13*; **Excerpt** on p. 173: Einstein, G. O., & McDaniel, M. A. (2005). Prospective memory: Multiple retrieval processes. *Current Directions in Psychological Science*, *14*, 286–290; **Excerpt** on p. 174: Schacter, D. L. (1999). The seven sins of memory: Insights from psychology and cognitive neuroscience. *American Psychologist*, *54*, 182–203; **Figure 5–11** p. 175: Based on Zimbardo, P. G., & Gerrig, R. J. (1999). *Psychology and life*, 15th ed. Boston, MA: Allyn and Bacon. Copyright © 1999 by Pearson Education; © Pearson Education, Inc.; **Figure 5–14** p. 179: © Pearson Education, Inc.; **Excerpt** on p. 179: Jean Piaget. (1962). *Play, dreams and imitation in childhood*, New York: Norton; **Excerpt** on p. 179: Kassin, S. (2001). Confessions: Psychological and forensic aspects. In N. J. Smelser & P. B. Baltes (Eds.), *International encyclopedia of the social & behavioral sciences*. Amsterdam: Elsevier; **Table 5.2** on p. 179: Schacter, D. L., Chiao, J. Y., & Mitchell, J. P. (2003). The seven sins of memory. *Annals of the New York Academy of Sciences*, *1001*(1), 226–239; **Excerpt** on p. 181–182: Zimbardo, P. G., & Gerrig, R. J. (1999). *Psychology and life*, 15th ed. Boston, MA: Allyn and Bacon. Copyright © 1999 by Pearson Education; **Excerpt** on p. 184: Ofshe, R., & Watters, E. (1994). *Making monsters: False memories, psychotherapy, and sexual hysteria*. New York: Charles Scribner's Sons; **Excerpt** on p. 184: Bass, E., & Davis, L. (1988). *The courage to heal* (pp. 21–22). New York: HarperCollins.

**Chapter 6 Excerpt** on p. 190: Smith, E. E., & Medin, D. L. (1981). *Cognitive Science Series: 4. Categories and concepts*.Cambridge, MA: Harvard University Press; **Figure 6–2** p. 193: Based on Solso, R. L. (1998). *Cognitive psychology*. Boston, MA: Allyn and Bacon. Copyright © 1998 by Pearson Education; **Excerpt** on p. 194: Cree, G. S., & McRae, K. (2003). Analyzing the factors underlying the structure and computation of the meaning of chipmunk, cherry, cheese, and cello (and many other such concrete nouns). *Journal of Experimental Psychology: General*, *132*, 163–201; **Excerpt** on p. 197: Brislin, R. (1993). *Understanding culture's influence*

*on behavior*. Fort Worth, TX: Harcourt Brace Jovanovich; **Excerpt** on p. 202: Lea Winerman (2012). Questionnaire: "A machine for jumping to conclusions" *Monitor on Psychology*, *43*, 2, 24–27; **Figure 6–6** p. 205: Adapted from Wickelgren, W. A. (1974). *Can you solve it? How to solve mathematical problems: elements of a theory of problems and problem solving*. San Francisco: W. H. Freeman. Copyright © 1974 by W. H. Freeman and Company. Reprinted by permission of Dover Publications; **Excerpt** on p. 204: Weisberg, R. (1986). *Creativity: Genius and other myths*. New York, NY: W. H. Freeman and Company; **Excerpt** on p. 204: Bink, M. L., & Marsh, R. L. (2000). Cognitive regularities in creative activity. *Review of General Psychology*, *4*, 59–78; **Excerpt** on p. 207: Gonzalvo, P., Cañas, J. J., & Bajo, M. (1994). Structural representations in knowledge acquisition. *Journal of Educational Psychology*, *86*, 601–616; **Excerpt** on p. 208: Binet, A. (1911). *Les idées modernes sur les enfants*. Paris: Flammarion; **Excerpt** on p. 215: Cattell, R. B. (1963). Theory of fluid and crystallized intelligence: A critical experiment. *Journal of Educational Psychology*, *54*, 1–22; **Figure 6–11** p. 217: http://thesecondprinciple.com/wp-content/uploads/2014/03/sternberg-chart.jpg; **Figure 6–13** p. 223: Philip Zimbardo, based on data from Sternberg, Robert J. Intelligence, creativity, and wisdom: Assessments of abilities for the 21st century. http://rethinkingadmissions.wfu.edu/docs/presenters/sternberg.pdf; **Excerpt** on p. 218: Winerman, L. (2005b, July/August). Fighting phobias: Figuring out phobia. *Monitor on Psychology*, *36*(7), 96–98; **Excerpt** on p. 218: Berry, J. (1992). Cree conceptions of cognitive competence. *International Journal of Psychology*, *27*, 73–88; **Excerpt** on p. 219: Fouts, R. (1997). *Next of kin: What chimpanzees have taught me about who we are*. New York: William Morrow; **Excerpt** on p. 220: Ouattara, K., Lemasson, A., & Zuberbuhler, K. (2009). Campbell's monkeys concatenate vocalizations into context-specific call sequences. Proceedings of the National Academy of Sciences, USA, December 9, 2009. Retrieved from www.pnas.org/content/early/2009/12/08/0908118106.short; **Excerpt** on p. 221: Strickland, B. R. (2000). Misassumptions, misadventures, and the misuse of psychology. *American Psychologist*, *55*, 331–338; **Table 6.2** on p. 222: Bouchard & McGue. (2003). Familial studies of intelligence: A review. *Science*, *212*, 1055–1059; **Excerpt** on p. 226: Helms, J. E. (1992). Why is there no study of cultural equivalence in standardized cognitive ability testing? *American Psychologist*, *47*, 1083–1101; **Excerpt** on p. 226: Trei, L. (2007, February 7). Fixed versus growth intelligence mindsets: It's all in your head, Dweck says. *Stanford University News Service*. Retrieved from: http://news.stanford.edu/pr/2007/pr-dweck-020707.html; **Excerpt** on p. 227: Underwood, E. (2014, October 22). Neuroscientists speak out against brain game hype. *Science*. Retrieved from http://news.sciencemag.org/brain-behavior/2014/10/neuroscientists-speak-out-against-brain-game-hype; **Excerpt** on p. 228: Shibley Hyde and Nicole Else-Quest. (2012). *Half the human experience*. Cengage Learning.

**Chapter 7 Excerpt** on p. 232: Phelps, J. A., Davis, J. O., & Schartz, K. M. (1997). Nature, nurture, and twin research strategies. *Current Directions in Psychological Science*, *6*, 117–121; **Excerpt** on p. 237: Courchesne, E., Chisum, H., & Townsend, J. (1994). Neural activity-dependent brain cells in development: Implications for psychopathology. *Development and Psychopathology*, *6*, 697–722; **Excerpt** on p. 239: Carolyn Gregoire. (2015). Study reveals sad link between poverty and children's brain development, *The Huffington Post*; **Excerpt** on p. 242: Based on Shaver, P. R., & Hazan, C. (1994). Attachment. In A. L. Weber & J. H. Harvey (Eds.), *Perspectives on close relationships* (Chapter 6, pp. 110–130). Boston: Allyn & Bacon; Based on Ainsworth, M. D. S. (1989). Attachments beyond infancy. *American Psychologist*, *44*, 709–716.; **Excerpt** on p. 242: Collins, N. L., & Read, S. J. (1990). Adult attachment, working models, and relationship quality in dating couples. *Journal of Personality and Social Psychology*, *58*, 644–663.; Hazan, C., & Shaver, P. R. (1990). Love and work: An attachment-theoretical perspective. *Journal of Personality and Social Psychology*, *59*, 270–280.; Kirkpatrick, L. A., & Shaver, P. R. (1992). An attachment-theoretical approach to romantic love and religious belief. *Personality and Social Psychology Bulletin*, *18*, 266–275.; Shaver, P. R., & Hazan, C. (1993). Adult attachment: Theory and research. In W. Jones & D. Perlman (Eds.), *Advances in personal relationships* (Vol. 4), pp. 29–70. London, UK: Jessica Kingsley; **Figure 7–2** p. 246: These data were reported in 1995 by J. M. Anglin of the University of Waterloo, Ontario, Canada; **Figure 7–5** p. 252: Adapted from Fig. 1, Baillargeon, R., & DeVos, J. (1991). Object permanence in young infants: further evidence. *Child Development*, *62*, 1230. © The Society for Research in Child Development; **Excerpt** on p. 254: Gallagher, W. (1994, September). How we become what we are. *The Atlantic Monthly*, 39–55, p. 47; **Excerpt** on p. 259: Rothenberger, A., & Banaschewski, T. (2007). Informing the ADHD debate. *Scientific American Reports*, *17*, 36–41; **Excerpt** on p. 259: JetBlue founder Richard Neeleman, *ADDitude Magazine*, http://www.additudemag.com/adhd/article/754.html; **Excerpt** on p. 260: Dale Archer (May 14, 2014). ADHD: The entrepreneur's superpower,*Forbes*; **Excerpt** on p. 269: Philip Zimbardo (May 23, 2012). *The demise of guys*. TED talk; **Excerpt** on p. 269: Nikita Coulombe (2015). *Man (dis)connected: How technology has sabotaged what it means to be male*. Random House; **Excerpt** on p. 271: Perry, W. G. Jr. (1970). *Forms of intellectual and ethical development in the college years: A scheme*. New York: Holt, Rinehart and Winston, p. 4; **Figure 7–11** p. 276: The Gottman Report Checklist was developed by Drs. John and Julie Gottman and The Gottman Institute. The Gottmans are world-renowned researchers and experts in family and couples relationships. To find out more about Gottman couples workshops, private therapy, training programs, and relationship products, visit www.gottman.com. The Gottman Report Checklist has been reprinted here with permissions from The Gottman Institute; **Excerpt** on p. 280: Arthur Stone quoted in Fields, H. (2010, May 17). Golden years truly are golden. *Science Now*. Retrieved from http://news.sciencemag.org/sciencenow/2010/05/golden-years-truly-are-golden.html; **Excerpt** on p. 282: Thompson, W. R., Schellenberg, E. G., & Husain, G. (2001). Arousal, mood, and the Mozart effect. *Psychological Science*, *12*, 248–251.

**Chapter 8 Excerpt** on p. 287: Meyer. (2011). *The Twilight Series, Book 1 | Release Date: October 5, 2005*. http://stepheniemeyer.com/twilight.html; **Figure 8–4** p. 292: Based on http://somatosphere.net/assets/freudoh.gif; **Excerpt** on p. 298: Gold, D. R., Rogacz, S., Bock, N., Tosteson,T. D., Baum, T. M., Speizer, F. E., & Czeisler, C. A.(1992). Rotating shift work, sleep, and accidents related to sleepiness in hospital nurses. *American Journal of Public Health*, *82*(7), 1011–1014; **Excerpt** on p. 300: William Shakespeare, *The Tragedy of Macbeth*, Act 2, Scene 2, Page 3; **Figure 8–7** p. 301: Republished with permission of Roffwarg et al., Ontogenetic development of the human sleep-dream cycle. *Science*, *152*, 604–616; permission conveyed through Copyright Clearance Center, Inc.; **Excerpt** on p. 302: Dement, W. C., & Vaughan, J. (1999). *The promise of sleep*. New York: Delacorte Press., p. 231; **Excerpt** on p. 305: Moss, R. (1996). *Conscious dreaming: A spiritual path to everyday life*. New York: Crown Publishing; **Excerpt** on p. 305: Mary Wollstonecraft Shelley (1831). *Frankenstein*, London: Colburn & Bentley; **Excerpt** on p. 305: Mary Wollstonecraft Shelley (1831). *Frankenstein*. London: Colburn & Bentley; **Excerpt** on p. 306: Moss, R. (1996). *Conscious dreaming: A spiritual path to everyday life*. New York: Crown Publishing; **Excerpt** on p. 307: Weil, A. T. (1977). The marriage of the sun and the moon. In N. E. Zinberg (Ed.), *Alternate states of consciousness* (pp. 37–52). New York: Free Press, p. 37; **Figure 8–9** p. 311: From the Monitoring the Future Study, University of Michigan. Reprinted by permission of the Inter-University Consortium for Political and Social Research; **Excerpt** on p. 317: Everitt, B. J., & Robbins, T. W. (2005). Neural systems of reinforcement for drug addiction: From actions to habits to compulsion. *Nat Neurosci*, *8*(11), 1481–1489.

**Chapter 9 Excerpt** on p. 324: Scott Chapman, 2012; **Excerpt** on p. 324: Fentress, Aaron. (Aug. 30, 2012). Marcus Mariota: Focused, laid-back leader Oregon Ducks are ready to follow. The Oregonian; **Excerpt** on p. 324: B. Chen, Marcus Mariota top contender for Heisman, 2014, Osini Faleatasi Inc.; **Excerpt** on p. 324: Tim Rohan, Marcus Mariota of Oregon Wins Heisman Trophy, and Hawaii Rejoices, Dec 13, 2014; **Excerpt** on p. 326: Neal, D. (Producer). (2000, September 20). [Television broadcast of Olympic Games]. New York: NBC. [As cited in Markus et al., 2006]; **Excerpt** on p. 327: Yamamoto, A. (Producer). (2000, October 8). NHK Special [Television broadcast of Olympic Games]. Tokyo: NHK. [As cited in Markus et al., 2006.]; **Excerpt** on p. 331: Based on Kenrick, D. T., Griskevicius, V., Neuberg, S. L., &

Schaller, M. (2010). Renovating the pyramid of needs: Contemporary extensions built upon ancient foundations. *Perspectives on Psychological Science*, *5*, 292–314; **Figure 9–5** p. 335: Based on Mintz, L. B., & Betz, N. E. (1986). Sex differences in the nature, realism, and correlates of body image. *Sex Roles*, *15*, 185–195; Striegel-Moore, R. H., Silberstein, L. R., & Rodin, J. (1993). The social self in bulimia nervosa: Public self-consciousness, social anxiety, and perceived fraudulence. *Journal of Abnormal Psychology*, *102*, 297–303; **Figure 9–6** p. 339: Gagnon, J. H. (1977). *Human sexualities*. Glenview, IL: Scott Foresman. Reprinted by permission of J. H. Gagnon; **Excerpt** on p. 340: Based on Peplau, L. A. (2003). Human sexuality: How do men and women differ? *Current Directions in Psychological Science*, *12*, 37–40; **Excerpt** on p. 342: Damasio, A. R. (1994). *Descartes' error: Emotion, reason, and the human brain*. New York: Avon Books. p. 45; **Figure 9–7** p. 344: Plutchik, R. (1980, February) A language for the emotions. *Psychology Today*, *13*(9), 68–78. Used with permission of Psychology Today © 2008; **Figure 9–10** p. 349: © Pearson Education, Inc.; **Box** p. 351–352: Zuckerman, M. (1978, February). The search for high sensation. *Psychology Today*, *12*, 38–46. Reprinted by permission of Sussex Publishers, Inc.; **Excerpt** on p. 352: James, W. (1890/1950). *The principles of psychology* (2 vols.). New York: Holt, Rinehart & Winston. (Original work published 1890.); **Excerpt** on p. 352: James, W. (1884:pp. 189–190). What is an emotion? *Mind*, *9*, 188–205; **Excerpt** on p. 355: Daniel Goleman (1995)., *Emotional Intelligence* (pp. 80–81).New York: Bantam Books; **Figure 9–13** p. 355: Salovey, P. & Grewel, D. (2005) The science of emotional intelligence. *Current Directions in Psychological Science*, *14*, 283; **Excerpt** on p. 356: Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D. & Schellinger, K. B. (2011, p.2). The impact of enhancing students' social and emotional learning: A meta-analysis of school based universal interventions. *Child Development*, *82*(1):405–432; **Table 9.2** p. 338: Ward, B. W., Dahlhamer, J. M., Galinsky, A. M., & Joestl, S. S. (2014, July 14). Sexual orientation and health among U.S. adults: National Health Interview Survey, 2013. National Health Statistics Reports, No. 77. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. Retrieved from http://www.cdc.gov/nchs/data/nhsr/nhsr077.pdf.

**Chapter 10 Excerpt** on p. 364: Furumoto, L. (1979). Mary Whiton Calkins (1863–1930), fourteenth president of the American Psychological Association. *Journal of the History of the Behavioral Sciences*, 15, 346–356. [Cited in Milar, K. S. (n.d.). An historical view of some early women psychologists and the psychology of women. Archived at the Classics in the History of Psychology site: **http://psychclassics.yorku.ca/Special/Women/variability.htm.**] p. 350; **Table 10.1** p. 368: Source: Based on **http://www.ac.wwu.edu/~culture/hofstede.htm**; **Figure 10–3** p. 370: FBI Statistics, 2013; **Excerpt** on p. 372: Hogan, R., Hogan, J., & Roberts, B. W. (1996). Personality measurement and employment decisions: Questions and answers. *American Psychologist*, *51*, 469–477; **Excerpt** on p. 373: Stavish, S. (1994, Fall). Breathing room. *Stanford Medicine*, *12*(1), 18–23. p. 7; **Figure 10–5** p. 375: Courtesy of the American Psychological Association; **Excerpt** on p. 375: Caprara, G. V., & Cervone, D. (2000). *Personality: Determinants, dynamics, and potentials*. New York, NY: Cambridge University Press; **Excerpt** on p. 379: Kairys, A. (2010). Time perspective: Its links to personality traits, age, and gender. Dissertation summary, Vilnius University, Lithuania, Social Sciences, Psychology (06S). pp.27, 28; **Excerpt** on p. 382: Former President Jimmy Carter in an interview published in the November 1976 issue of Playboy magazine.; **Excerpt** on p. 386: Westen, D. (1998). The scientific legacy of Sigmund Freud: Toward a psychodynamically informed psychological science. *Psychological Bulletin*, *124*, 333–371; **Excerpt** on p. 386: Mark Solms. (2006). Freud returns. *Scientific American*, a Division of Nature America, Inc. p. 29; **Excerpt** on p. 386: Ayan, S. (2006, April/May). Laughing matters: Seeing the bright side of life may strengthen the psyche, ease pain and tighten social bonds. *Scientific American*, *20*(2), p. 36; **Excerpt** on p. 387: Edward Bernays, *Propaganda*, Ig publishing, 2005, paper (originally published in 1928), p. 71; **Excerpt** on p. 390: Horney, K. (1942). *Self-analysis*. New York: Norton. (p. 40); **Excerpt** on p. 395: Frankl, V. (1996). *Man's search for meaning*. Boston, MA: Beacon Press; **Excerpt** on p. 395: Maddi, S.R. (2004). Hardiness: An operationalization of existential courage. *Journal of Humanistic*

*Psychology*, *44*, 279–298; **Excerpt** on p. 398: Based on "Personality Change Following Unemployment," by Christopher J. Boyce, PhD, and Alex M. Wood, PhD, University of Stirling and University of Manchester; Michael Daly, PhD, University of Stirling; and Constantine Sedikides, PhD, University of Southampton, *Journal of Applied Psychology*; online, Feb. 9, 2015; **Excerpt** on p. 405: Francis Galton, Personal Identification And Description, Nature June 28, 1888 pp. 201—202.

**Chapter 11 Figure 11–7** is missing; **Figure 11–13** has multiple credits; **Table 11.1** p. 415: Based on Liu, A., et al. (2009). Findings from the 2008 Administration of the College Senior Survey (CSS): National aggregates. Retrieved March 21, 2015, from http://www.intellectualtakeout.org/library/chart-graph/political-values-american-college-students; **Table 11.2** p. 418: Mann, L. (1980). Cross-cultural studies of small groups. In H. C. Triandis & R. Brislin (Eds.), *Handbook of cross-cultural psychology* (Vol. 5, pp. 155–209). Boston, MA: Allyn & Bacon; **Excerpt** on p. 420: Berns, G. S. Chappelow, J., Zink, C. F., Pagnoni, G., Martin-Skurski, E. M., & Richards, J. (2005). Neurobiological correlates of social conformity and independence during mental rotation. *Biological Psychiatry*, *58*, 245–253; **Excerpt** on p. 421: U.S. Senate Select Committee on Intelligence. (2004). Report on the U.S. Intelligence Community's Prewar Intelligence Assessments on Iraq: Conclusions. Retrieved on November 23, 2004, from http://intelligence.senate.gov/conclusions.pdf; **Excerpt** on p. 421: Lisa McLeod (2013) 3 situations that call for a red team. TheHuffingtonPost.com, Inc.; **Excerpt** on p. 422: C. P. Snow quoted in Quotations on *Terrorism* by Harry Kawilarang, Trafford Publishing, 2004; **Figure 11–4** p. 424: Miller, A. G. (1986). *The obedience experiments: A case study of controversy in the social sciences*. Westport, CT: Praeger Publishers; **Excerpt** on p. 425: Haslam, Miller, & Reicher, Eds. (2014). Milgram at 50: Exploring the enduring relevance of psychology's most famous studies, Wiley-Blackwell; **Excerpt** on p. 427: Stanley Milgram. (2009). *Obedience to authority: An experimental view.* New York: HarperCollins; **Excerpt** on p. 428: Haile Selassie quoted in *Carnal society: The Texas-national sex scandal*, Randal R. Chance, AuthorHouse, 2013; **Figure 11–5** p. 429: Darley, S. M. & Latané, B. (1968). Bystander intervention in emergencies: diffusion of responsibilities. *Journal of Personality & Social Psychology*, *8* (4), pp. 377–384. Copyright © 1968 by the American Psychological Association; **Excerpt** on p. 430: Moriarity, T. (1975). Crime, commitment and the responsive bystander: Two field experiments. *Journal of Personality and Social Psychology*, *31*, 370–376; **Excerpt** on p. 430–431: Schroeder, D. A., & Prentice, D. A. (1995). Pluralistic ignorance and alcohol use on campus II: Correcting misperceptions of the social norm. Unpublished manuscript, Princeton University; **Figure 11–6** p. 431: Darley, J. M., & Batson, C. D. (1973). From Jerusalem to Jericho: A study of situational and dispositional variables in helping behavior. *Journal of Personality and Social Psychology*, *27*, 100–108; **Figure 11–8** p. 434: Based on Griffin, E. (2011). *A first look at communication theory*, 8th ed. (pp: 114–115). New York: McGraw-Hill; **Excerpt** on p. 434: Sternberg, R. J. (1998). *Cupid's arrow: The course of love through Time*. New York: Cambridge University Press; **Excerpt** on p. 437–438: Sternberg, R. J. (1998). *Cupid's arrow: The course of love through time*. New York: Cambridge University Press; **Figure 11–9** p. 438: Data from Nathan Lester, http://nathensmiraculousescape.com/about/; **Figure 11–10** p. 440: Based on data from Fiske, S. T., Cuddy, A. J. C., & Glick, P. (2007). Universal dimensions of social cognition: warmth and competence. *Trends in Cognitive Science*, *11*, 77–83; **Excerpt** on p. 440: Smith, C. A., & Ellsworth, P. C. (1987). Patterns of appraisal and emotion related to taking an exam. *Journal of Personality and Social Psychology*, *52*, 475–488; **Excerpt** on p. 443: Source: Keen, S. (1991). *Faces of the enemy: Reflections of the hostile imagination*. San Francisco: Harper; **Excerpt** on p. 446: Elliot Aronson (2001). *Nobody left to hate*. Macmillan; **Excerpt** on p. 449: Claudia Dreifus (January 5, 2015). A MacArthur grant winner tries to unearth biases to aid criminal justice. *New York Times Science*; **Figure 11–13** p. 450: Republished with permission of American Association for the Advancement of Science, from Eisenberger, Lieberman, and Williams, *Science*, 2003 [social pain images]. http://www.strategy-business.com/media/image/09306-ex01b.gif; permission conveyed through Copyright Clearance Center, Inc.; **Figure 11–13** p. 450: Republished with permission of Elsevier,

from Lieberman et al. (May 2004). The neural correlates of placebo effects: a disruption account, *NeuroImage* [physical pain images]; permission conveyed through Copyright Clearance Center, Inc.; **Figure 11–13** p. 450: © Pearson Education, Inc.; **Excerpt** on p. 450: Social pain: A conversation with Naomi Eisenberger [9.10.14] Edge Videos; **Figure 11–15** p. 453: Gerrig, Richard J., Zimbardo, Philip G. *Psychology and life*, 18th Ed., ©2008, p. 547. Reprinted and electronically reproduced by permission of Pearson Education, Inc., New York, NY; **Excerpt** on p. 455: Department of Defense (2005). *The Schlesinger Report: An investigation of Abu Ghraib*. Cosimo, Inc.; **Excerpt** on p. 457: Evelyn Field. (2007). *Bully blocking: Six secrets to help children deal with teasing and bullying* (pp. 7–8). Jessica Kingsley Publishers; **Excerpt** on p. 457: Danah Boyd quoted in Leach, A., 2010. [The problem with Cyber-Bullying is the Bullying not the Cyber bit, says social researcher Danah Boyd: Shiny Shiny. Shiny Shiny: Gadgets, Web Stuff, Tech Reviews and Geeky LOLs. Retrieved March 1, 2012, from http://www.shinyshiny.tv/2010/11/social_researcher_cyber_bullying.html; **Excerpt** on p. 457: Peter Goldbaum quoted in Amy Novotney, Preventing harassment at schools - Peter Goldblum helps elementary schools promote respect and acceptance of diversity. March 2008, Vol 39, No. 3; **Excerpt** on p. 457: Gershen Kaufman, Stick Up For Yourself: Every Kid's Guide to Personal Power and Positive Self-Esteem (Free Spirit Publishing, 1999). (p. ii); **Excerpt** on p. 460: Lash, J. (2001). Dealing with the tinder as well as the flint. *Science*, *294*, 1789; **Excerpt** on p. 461: John Donne, Meditations XVII, 1624

**Chapter 12 Excerpt** on p. 465: Rosenhan, D. L. (1973a, p. 257). On being sane in insane places. *Science*, *179*, 250–258; **Excerpt** on p. 465: Rosenhan, D. L. (1973a, p. 257). On being sane in insane places. *Science*, *179*, 250–258; **Excerpt** on p. 465: Rosenhan, D. L. (1973a, p. 252). On being sane in insane places. *Science*, *179*, 250–258; **Figure 12–4** p. 469: Created by author; **Table 12.3** p. 474: Weissman, M. M., et al. (1996, July 24–31). Cross-national epidemiology of major depression and bipolar disorder. *Journal of the American Medical Association*, *276*, 293–299; **Figure 12–5** p. 476: Adaptation of Figure 1 from Mayberg, H. S. (2006). Defining neurocircuits in depression: Strategies toward treatment selection based on neuroimaging phenotypes. *Psychiatric Annals*, *36*(4), 259–268; **Figure 12–7** p. 477: Based on Figure 1 from Rosenthal, N. E., Sack D. A., Gillen, J. C., Lewy, A. J., Goodwin, F. K., Davenport, Y., Mueller, P. S., Newsome, D. A., & Wehr, T. A. (1984). Seasonal affective disorder: a description of the syndrome and preliminary findings with light therapy. *Archives of General Psychiatry*, *41*, pp. 72–80; **Excerpt** on p. 483: *Diagnostic and Statistical Manual - V* published by the American Psychiatric Association. (DSM-IV). p. 479; **Excerpt** on p. 484: Rogers, C. R. (1982, July/August). Roots of madness. In T. H. Carr & H. E. Fitzgerald (Eds.), *Psychology 83/84* (pp. 263–267). Guilford, CT: Dushkin. (Originally published in *Science* 82, July/August, 1982); **Figure 12–9** p. 485: American Psychiatric Association. (2000.) *Diagnostic and Statistical Manual of Mental Disorders* (5th ed., p. 99). Washington, DC: Author; **Excerpt** on p. 489: Cuthbert, B.N., & Insel, T.R. (2013). Toward the future of psychiatric diagnosis: the seven pillars of RDoC. *BMC Medicine, 11*:126; **Excerpt** on p. 492: Kleinman, A., & Cohen, A. (1997). Psychiatry's global challenge. *Scientific American*, *276*(3), 86–89; **Excerpt** on p. 493: Rosenhan, David L. (1973). On being sane in insane places. *Journal Science*; **Excerpt** on p. 493: Rosenhan, D. L. (1973a). On being sane in insane places. *Science*, *179*, 250–258. p. 257

**Chapter 13 Excerpt** on p. 500: Albee, G. W. (2006, Fall). Is it time for the Third Force in American psychology? *The General Psychologist*, *41*(2), 1–3. Retrieved February 16, 2008, from www.apa.org/divisions/div1/archive.html. p. 3; **Excerpt** on p. 504–505: Freud, S. (1957, pp. 277–279). *A General introduction to psychoanalysis*. New York: Permabooks. (J. Riviere, Trans. Original work published 1920 by Horace Liveright.); **Excerpt** on p. 507: Rogers, C. R. (1951, p. 152). *Client-centered therapy: Its current practice, implications and theory*. Boston: Houghton Mifflin. p. 152; **Excerpt** on p. 507–508: Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979, pp. 145–146). *Cognitive therapy of depression*. New York: Guilford Press. pp. 145–146; **Excerpt** on p. 509: Nungesser, L. G. (1990). *Axioms for survivors: How to live until you say goodbye*. Santa Monica, CA: IBS Press; **Excerpt** on p. 510: Wolpe, J. (1958). *Psychotherapy by reciprocal inhibition*. Stanford, CA: Stanford

University Press; **Figure 13–4** p. 511: Wolpe, J. (1991). *The practice of behavior therapy*, 4th ed. Boston, MA: Allyn & Bacon. Copyright © 1991 by Pearson Education; **Excerpt** on p. 511–512: Based on Kazdin, A. E. (1994). *Behavior modification in applied settings*, 5th ed. Pacific Grove, CA: Brooks/Cole; **Figure 13–5** p. 512: Cook, M., Mineka, S., Wokenstein, B., & Laitsch, K. (1985). Observational conditioning of snake fear in unrelated rhesus monkeys. *Journal of Abnormal Psychology*, *94*, pp. 591–610. Copyright © 1985 by American Psychological Association; **Figure 13–6** p. 513: Bandura, A. D. (1970). Modeling therapy. In W. S. Sahakian (Ed.), *Psychopathology today: Experimentation, theory, and research*. Itasca, IL: Peacock; **Excerpt** on p. 527: Rebecca A. Clay, 2009, p. 42. Prevention works - A major report documents how early intervention with children and adolescents significantly improves their long-term welfare—and could save billions. September 2009, Vol 40, No. 8; **Excerpt** on p. 529: West, C. (2009, October). An unconscionable embarrassment. *Observer*, *22*(8), 9, 11; **Excerpt** on p. 531: APA Presidential Task Force on Evidence-Based Practice. (2006). Evidence-based practice in psychology. *American Psychologist*, *61*, 271–285.

**Chapter 14 Excerpt** on p. 535–536: Smith, D. (2003b). *Report from Ground Zero* (pp. 70–71). New York: Penguin; **Excerpt** on p. 539–540: Based on Cohen, R. E., & Ahearn, F. L., Jr. (1980). *Handbook for mental health care of disaster victims*. Baltimore: Johns Hopkins University Press; **Excerpt** on p. 541: Hollander, E. M. (2004). Am I all right? *Journal of Loss and Trauma*, *9*, 201–204; **Figure 14–2** p. 542: The Illusion of Work, **https://theillusionofwork.files.wordpress.com/2012/07/change-curve.png**; **Excerpt** on p. 542: National Public Radio. (2003a, August 19). Interview: Kenneth Kendler on study about severity of depression depends on the cause. Morning Edition; **Excerpt** on p. 543: Rosemary K.M. Sword and Philip Zimbardo, Shunning – The Ultimate Rejection, Feb 01, 2013; **Figure 14–3** p. 546: American Psychological Society; **Excerpt** on p. 547: Maslach, C., & Leiter, M. P. (2005). Stress and burnout: The critical research. In C. L. Cooper (Ed.), *Handbook of stress medicine and health*, 2nd ed. (pp. 153–170). Boca Raton, FL: CRC Press LLC; **Excerpt** on p. 547: Smith, D. (2003b). *Report from Ground Zero*. New York: Penguin. pp. 70–71; **Excerpt** on p. 549: Rambo-Chroniak, K. M. (1999). Coping and adjustment in the freshman year transition. Unpublished dissertation, Northwestern University, Chicago, IL. (Dissertation Abstracts International, 59 [June], 12-A, 4378.); **Excerpt** on p. 550: Nowack, K. M. (1983). The relationship between stress, job performance, and burnout in college resident assistants. *Journal of College Student Personnel*, *24*, 545–550; **Figure 14–9** p. 556: Data from Nature Reviews Cardiology, Vol 10., No. 5. (May 2013); **Excerpt** on p. 559: Friedman, M., & Ulmer, D. (1984). *Treating type A behavior—and your heart*. New York: Knopf; **Excerpt** on p. 560: Rothbaum, F. M., Weisz, J. R., & Snyder, S. S. (1982). Changing the world and changing the self: A two-process model of perceived control *Journal of Personality and Social Psychology*, *42*, 5–37; **Figure 14–11** p. 561: © Pearson Education, Inc.; **Excerpt** on p. 562: Seligman, M. E. P. (1991). *Learned optimism*. New York: Knopf; **Excerpt** on p. 562: Based on **USMagazine.com**. (2010, January 29). Christina Applegate "Did a 180" after beating Cancer. Retrieved from **www.usmagazine.com/healthylifestyle/news/christina-applegate-did-a-180-after-cancer-2010291**; **Table 14.3** p. 563: Adapted from Bonanno, G. A. (2009). *The other side of sadness: What the new science of bereavement tells us about life after loss*. New York: Basic Books; and Bonanno, G. A., & Mancini, A.D. (2008). The human capacity to thrive in the face of extreme adversity. *Pediatrics*, *121*, 369–375; **Excerpt** on p. 563: Bonanno, G. A. (2009). *The other side of sadness: What the new science of bereavement tells us about life after loss*. New York: Basic Books; **Excerpt** on p. 566–567: Taylor, S. E. (1983). Adjusting to threatening events: A theory of cognitive adaptation. *American Psychologist*, *38*, 1161–1173; **Excerpt** on p. 567: Frankl, V. (1959). *Man's search for meaning*. New York: Simon and Schuster; **Excerpt** on p. 567: G. M. Reed, cited in Shelley E. Taylor, *Health psychology* (McGraw-Hill 1999); **Excerpt** on p. 569: McNally, R. J., Bryant, R. A., & Anke, E. (2003). Does early psychological intervention promote recovery from posttraumatic stress? *Psychological Science in the Public Interest*, *4*(2), 45–79. doi: 10.1111/1529-1006.01421; **Excerpt** on p. 571: Shapiro, S. L., Astin, J. A., Bishop, S. R., & Cordova, M. (2005). Mindfulness-based stress reduction for health care professionals: Results from a randomized trial. *International Journal of*

# Name Index

# Subject Index

Note: Page numbers followed by f or t refer to figures or tables.